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The Oily Way

FOR past generations it was the gas industry that could always capture public imagination with its range of chemical products, and it was not always realized that many of these, tidily exhibited in tubes or bottles, were produced only on a small scale. The conversion of oil into chemicals has a good many differences. The 'oil chemicals' are not always by-products obtained by removing 'impurities' from a main fuel-refining process; more often they are genuine end-products and oil is their starting raw material. Moreover, chemicals-from-oil processes, as processes in their own right and not sidelines to some other main process conducted for other purposes, are exceptionally flexible. They can be stopped at various points, each with a harvest of marketable material to be taken. Indeed, one of the major decisions in oil-based chemistry is to decide just when to stop and what to sell. A chemicals-from-oil plant can aim at making ethylene as its main product, providing this as an important and primary material for other sectors of the chemical industry, or it can carry processing further and produce both intermediate and final products. Shell and ICI follow this latter course, but BP, Esso, and Distillers have so far preferred to concentrate upon supplying the simpler intermediate products.

It is, perhaps, necessary to be a non-chemist, or at any rate to possess a high capacity for detachment, to be able to assess the extent and implications of this post-war revolution in industrial chemistry. The commercial-cum-economic consequences are themselves revolutionary. When a large chemicals-from-oil works concentrates upon producing intermediates that are starting materials for other processes, the one type of manufacture must be linked with the other and this requires co-operative arrangements between large organizations. Examples are the proposed linking of Fisons and Shell Chemicals for producing fertilizers from products of the Shell Haven refinery, and the BP-Grangemouth refinery set-up where intermediates are fed to chemical works operated by several other companies, including Monsanto and Distillers. Arrangements of this kind are developing to deal with the output of oil-chemicals from Fawley's proposed £9 million plant. Much of the output of intermediates from this plant will be taken by the new International Synthetic Rubber Co., but there will also be a considerable supply of oil-chemicals to new plants built near the refinery by Monsanto. There is nothing new in co-operation between large companies so that one company can develop facilities to use the products of the other. But if the principle is old, the scale of application is new, and the extent to which the interests of huge chemical organizations are becoming interwoven is probably unprecedented. Nor, having regard to the nature of chemicals-from-oil processes and the massive capital expenditure required to give them life, could this be otherwise.

A significant aspect of all this massive and interlocked development is its effect upon left-wing political ideas about nationalization. Labour's policy manifestos are rarely without some reference to the need to bring 'parts' of the chemical industry into the fold of public

ownership. Defining these 'parts' seems to present the same kind of problem as the curate faced in assessing the quality of the bishop's egg. The oil companies recently made it more than clear that Europe's expanding requirements for oil as fuel can be met, provided that political interferences with normal trading methods are avoided. To quote from the OEEC report on Europe's energy requirements (THE CHEMICAL AGE, 1956, **74,** 1357): 'From our examination of the oil position we conclude that, if required, oil imports should be able to fill the energy gap provided that nothing were done to prevent the integration of the supply of oil products to Western Europe as part of the international oil industry.' Only a small proportion of Europe's oil consumption can come from her own resources. Most of it must be imported. In the British case, dependence upon imports is almost total; we have huge refineries but we possess not even moderately-sized wells. Any attempt to bring oil chemicals under public ownership would have all the semblance of the thin end of the wedge. Yet as the production of major chemical materials from oil expands, the possibility of disentangling any one kind of production from other kinds becomes less and less practicable. Indeed, what any person can now call 'the chemical industry' becomes less and less definable.

Not even the charge of monopoly—nationalization's parrot-cry—can be justified or intensified through these oil-chemical developments. At present ethylene would be admitted by most people to be oil's major chemical product. Fawley's output is likely to be from 10,000 to 40,000 tons a year. At Grangemouth the 30,000 tons annual output is being increased to 60,000. Shell's plans are said to aim at producing at least 80,000 tons a year. ICI's Wilton production, also scheduled to be doubled in the near future but even then not above some 90,000 tons a year, is already only a part of this fast-growing total. Esso, BP, Shell, ICI—here is no monopoly scene for ethylene; nor with the new polythene processes is there any monopoly in ethylene's further conversion into end-products. The new chemical revolution has brought competition that can best be described as buoyant. At present intensity of competition is obscured for ethylene is scarce—it is not only the industrial precursor of polythene, but is needed for tetra-ethyl lead, styrone, acrylonitrile, Terylene, and anti-freeze compounds.

Earlier we made the observation that this revolution could be observed more clearly from an external, non-chemical viewpoint. For chemists tend to take what is now being done with oil for granted because they have long known that these developments were possible. The value of ringside assessment was made particularly clear by a recent article in *The Economist* ('Chemicals from Oil', 1956, **179,** 1207), and we are indebted to this article for some of the data utilized here. It is not often possible during a time of rapid and vast change, such as this twentieth century, to be able to see ourselves as others see us.

NEWS BRIEFS

Foundation Stone Laid

A foundation stone was laid on 26 June at the Sunbury-on-Thames research station of the British Petroleum Co. to mark the start of the construction of a new analytical chemistry and physics laboratory. This will be the central unit of an important new expansion scheme which will be completed in 1958, and which includes five other buildings in addition to the analytical chemistry and physics laboratories.

Agents for Beckman

Baird & Tatlock Ltd., who announced earlier in the year that they had been appointed agents for the Beckman Division of Beckman Instruments Inc., now state that they are equipped to deal with orders and to provide a comprehensive service for Beckman spectrophotometers in this country. New spectrophotometers will be installed and serviced free of charge during the guarantee period. A wide range of spectrophotometers and allied instruments is now available from Beckman's Munich factory, and others can be imported directly from the United States.

Ireland's First Fishmeal Factory

Northern Ireland's first fishmeal factory at Ardglass, a fishing port in County Down, has been handed over by the Northern Ireland Ministry of Commerce to the tenants, Burnhouse Animal Products Ltd., Lisburn, County Antrim. It was built in 12 weeks by Coseley Engineering Co., Wolverhampton. The plant has been provided by the Herring Board for whom it will be operated by Burnhouse Animal Products.

BISRA Open Days at Sheffield

The British Iron and Steel Research Association will hold two open days at the Sheffield Laboratories on 6 and 7 September 1956, for representatives of member firms. These will primarily provide the opportunity for demonstrating the progress which has been made by those divisions of BISRA housed at Sheffield—mechanical working, steelmaking, and metallurgy (general)—since the premises were opened in November 1953 by the Duke of Edinburgh.

Second Platformer for Shell

The second platforming unit built for Shell in the UK is now in operation at Shell Haven Refinery, Essex. The first unit of this type ever to be erected in this country came on stream at the company's Stanlow Refinery, Cheshire, in December 1953. Erected at a cost of approximately £2½ million, the Shell Haven unit will produce a high octane component for blending into motor spirit.

OCCA Technical Exhibition 1957

Preliminary arrangements for the ninth technical exhibition of the Oil & Colour Chemists' Association have now been completed. It will take place at the New Hall of the Royal Horticultural Society at Greycoat and Elverton Street, London SW1, on 12, 13, 14 March, 1957, the hours of opening on the first day being 3 p.m. to 7.30 p.m., the opening ceremony taking place at 3 p.m. On the second and third days the opening hours will be from 10 a.m. to 7.30 p.m. There will be an exhibition luncheon at the Criterion Restaurant, Piccadilly, London W1, on the first day.

Bitumen Specialists Plan Expansion

William Briggs & Sons Ltd., bitumen specialists, Glasgow C3, have had plans approved for the erection of extensions to their premises in Old Dumbarton Road, Glasgow.

Test House at Derby

International Combustion Ltd. announce that the full facilities of their test house at Derby are now available to industry. The building is fully equipped with testing apparatus suitable for the chemical and mining industries.

New Type of Drawing Board

Angula Engineering Co. has developed a new type of drawing board designed to eliminate 'ghosting' and to provide a perfect drawing surface. Known as the Angula Composite drawing board, it is manufactured in materials that enable a resilient surface to be bonded to the board. Made in all standard sizes, it is about to be released for general distribution after over two years' proving in selected drawing offices.

Visit to Sunbury

A party of members of the Parliamentary and Scientific Committee (a group of members of both Houses of Parliament and certain scientific and technical institutions) visited British Petroleum's research station at Sunbury-on-Thames on 20 June.

The Ferodo Story

'The Ferodo Story', a film which tells the story of the development of clutch and brake linings through half a century is now available for screening at trade gatherings, technical conventions and car club meetings.

Gentleman from Japan

FORTHCOMING developments in the petroleum chemical industry of Japan were mentioned by Mr. Shojiro Uematsu, a director of the Lion Oil & Fat Co. Ltd. of Tokyo, when he met members of the technical press in London on 29 June. Big works are being planned, said Mr. Uematsu in which Standard Oil and Shell are understood to have substantial interests.

Mr. Uematsu has been in Europe and the US for two months studying the chemical, soap and fats industries. In this country he has been the guest of Jacobson van den Berg & Co. (UK) Ltd., London, importers of chemicals and chemical products. Accompanied by Mr. Gordon F. Pursey of that company, Mr. Uematsu went to a number of factories including those of Colgate-Palmolive-Peet, Thomas Hedley (Grays Thurrock), A. Boake, Roberts, Marchon Products and the Simon Group at Stockport.

The Japanese visitor told THE CHEMICAL AGE that he was very impressed with all he had seen in the UK, and greatly appreciated the courtesy shown to him by the managements of the companies he had called on. He thought very highly indeed of the packaging machinery made in this country.

It is understood that a new factory for the manufacture of soap and synthetic detergents is being planned at Osaka and may be in operation by 1957 or 1958. At the present time detergents are used in Japan only in comparatively small quantities, but the Japanese are anxious to extend the uses of synthetic detergents for industrial and domestic purposes so as to reduce the imports of raw materials. They hope to build up exports of detergents.

Floating Waterworks in Iraq

A 'FLOATING waterworks', built by a Wolverhampton firm, has just gone into service in Iraq. It will play an important part in supplying pure drinking water to remote areas of the country where villagers have, in the past, had to rely on the bacteria-laden waters of rivers and canals.

The plant has been made in the Wolverhampton works of Marston Excelsior Ltd., a subsidiary company of Imperial Chemical Industries Ltd., from an original specification by Mr. George Smethurst, a Baghdad water engineer who has co-operated with UNESCO in seeking to solve the problem of water supply in Iraq.

The first prototype of the 'waterworks' was put into operation in Iraq a year ago. As a result of working experience, various improvements were made. The latest model recently underwent river tests in England and has now been shipped to Iraq. Construction of further similar models is planned.

The plant comprises a series of welded units bolted together to make up a vessel, on top of which the pumping and treatment plant is mounted. The unit is moored to the river bank by an arm pivoted to allow a rise or fall according to river level. The elements of a complete waterworks are present, sedimentation tanks, filters, chemical dosers and pumps, but in this case the high level tank is replaced by a well known waterworks device called a pneumatic booster in which water is stored at high pressure against a cushion of compressed air.

The output of the floating plant is at a rate of about 1,200 gallons per hour against a head of 80 ft. with a maximum rate of 2,400 gallons per hour against a similar head.

Acrilan Plant in Ulster

UNDER an agreement concluded with the Government of Northern Ireland, Chemstrand Ltd. will spend more than £3½ million to build a plant to manufacture Acrilan acrylic fibre at Coleraine, Northern Ireland.

A site of about 70 acres is being acquired for the building of the plant and an option has been taken on a further 130 acres to allow for possible extensions. Construction will commence at an early date and production is expected to begin in January 1959. Initial employment for about 400, mainly men, will be provided.

Chemstrand is establishing its headquarters in London at an address to be announced later. The sales service office is at 521 Royal Exchange, Manchester 2, and warehousing will also be located at Manchester.

Atomic Scientist Dies

The death occurred in Perth, Western Australia, on 27 June of DR. CECIL EDDY who supervised the safety arrangements for the atomic tests in the Monte Bello Islands on 19 June. Since 1935 Dr. Eddy had been director of the Commonwealth X-ray and Research Laboratory in Melbourne.

NOTE & COMMENT

A PHARMACEUTICAL INDUSTRY in Burma is rapidly taking shape. The agreement of late 1953 between the Union of Burma Government and Evans Medical Supplies Ltd. has been followed swiftly by events, as this timetable from an interim report shows:

October 1953	agreement signed
November 1953	architects appointed
February 1954	site chosen
August 1954	main building contract signed
September 1954	main contractors start construction
May 1955	temporary production unit starts manufacture
January 1956	latter officially opened

Completion of building work is expected by September this year, and by the end 1956 it is hoped that all plant and machinery will have been delivered and installed. The area to be covered by the buildings will be 316,200 square feet. There will be a main pharmaceutical production building, a biological centre for preparing sera and vaccines, an animal farm to provide test animals, a distillery based on broken rice turning out 2,500 gallons a day of industrial or medicinal alcohol, a yeast plant to produce half a ton per day of medicinal yeast for vitamin tablets and, of course, many ancillary buildings such as offices, workshops and stores. It will represent an investment by Burma of some £5 million.

Progress Report

THE BURMA-EVANS agreement recognized the necessity for European staff initially, and some are already in that country, while others are being trained here for duty in Burma later on. At the same time Burmese nationals are being trained for supervisory posts, and Burmese state scholars have been sent from Rangoon University to study pharmacy at UK universities. The recruiting and training of about 100 Burman operative workers has also been started this year. Indeed, with such remarkably rapid progress being made on the constructional side of the project, it is fortunate that as much progress has been possible in the staffing problem, or the end of the year might well have brought a huge new pharmaceutical factory with too few people to work in it. Evans Medical Supplies will manage the new industry for an initial period of seven years. What this company has already done to bring the industry into being is a notable contribution to Anglo-Burmese friendship, and there seems to be no grudging recognition of this fact in Burma of today.

At the Pictures

A FAIRLY NEW and highly interesting publication, *Scientific Film Review*, is published by the Scientific Film Association bi-monthly. Special mention is certainly due to the current issue (June 1956). It is devoted to films on chemistry, and provides a long list of these films, classified into theme- or subject-groups, and in many cases with useful notes about them. Although it is not claimed that the list is complete, it hardly seems likely that many films of significance have been left out. The London section of the Royal Institute of Chemistry has become particularly film-minded since 1946. Initially this interest was entirely utilitarian; for extending activities outside the metropolitan area itself, the section believed that films would be more appreciated than lectures. From this began a search for films on chemistry suitable for showing to chemists. Gradually various forms of co-operation between the scientific film makers and chemists were developed.

Chemistry is not particularly photogenic. It is not a mobile subject and this is one of the primary requirements of 'good cinema'. A reaction may be vigorous indeed, but it occurs within the imperturbable walls of plant or apparatus that are usually immobile. The greatest scope is given with chemical subjects that are (1) applied or technological, (2) aimed at a general audience. Such films also tend to predominate because they are the type more likely to be made by

companies or trade associations for publicity purposes, and as even short films are costly to produce, industry is the principal sponsor or maker. But chemistry needs other kinds of films—on pure chemistry, teaching films for technique-demonstrating purposes, and research films. The need for films that will help in instructing students in specialized analytical methods is very pronounced. Not many can yet be listed. Indeed, the scientific film that can assist in teaching students has hitherto developed somewhat haphazardly. Biology, an easily photogenic subject, can claim nearly 75 per cent of the films available. As against 47 films of this kind on physics, there are only 16 on chemistry. Some readers may want to follow up this subject more fully; this special 'chemistry films' issue of *Scientific Film Review* can be obtained from the Scientific Film Association, 164 Shaftesbury Avenue, London WC2, at the single number price of 3s 6d.

Subsidiary Formed

SCIENTIFIC Design Co., Inc. has formed a wholly-owned subsidiary for the construction of industrial plants in the chemical field, according to an announcement by Harry A. Rehnberg, President of SD. The title of the new firm is SD Plants, Inc., and it will shortly complete its first two major projects: A polyvinyl chloride plant in Passaic, NJ, for the Eleonora Chemical Corp., a subsidiary of The Pantasote Co., and a polyvinyl chloride plant in Leominster, Mass., for the chemical division of The Borden Company. Both plants are scheduled to begin operation this summer.

Officers of SD Plants, Inc. are Harry A. Rehnberg, president; Ralph Landau, vice-president; Robert B. Egbert, vice-president; and Thomas P. Brown, vice-president.

Precision Instrument Leaflets

Two illustrated leaflets have been issued by Croydon Precision Instrument Co. describing the company's latest products. Leaflet No. 64 describes the company's precision instrument switches intended primarily for use in precision resistance units, strain gauge selection, and thermocouple work. Leaflet No. 61 describes the firm's AC-DC convertor (vacuo junction type) for use with precision DC potentiometers.

Coal & Chemicals

MAJOR attempts are being made by the National Coal Board to help avert the acute fuel and energy famine which threatens the country.

This was revealed last week when the press were invited to inspect the Board's Research Establishment at Stoke Orchard, Glos.

Dr. J. Bronowski explained how important coal by-products were to the national economy and added that perhaps the long-term future of coal depended upon the best exploitation of these by-products and all the chemical materials which could be obtained from coal.

A special department of the Research Establishment is studying these chemical constituents and methods of practical application.

New Tyne-Side Factory

A NEW factory built at Fawdon, Newcastle-on-Tyne, by Sterling Drug Inc. of New York is about to be brought into production. A new subsidiary company, Winthrop Laboratories Ltd., has been formed to operate the factory, which will make the products of Scott & Turner, Bayer Products Ltd. and Charles H. Phillips Chemical Co. Ltd.

When in full production the new plant, which has cost about £1,750,000, will employ nearly 1,000 men and women.

Mr. A. W. Kay, a director of Scott & Turner, has been appointed managing director of Winthrop Laboratories Ltd.

Titanium Production Resumed

Production of titanium at the ICI works, Witton, has been restored to normal after having been suspended for several weeks to allow for the provision of additional safety precautions. It will be recalled that on 18 April a minor explosion, caused by a puncture in a crucible, occurred in the titanium plant. At the time a statement was issued by ICI to the effect that the likelihood of such explosions appeared to be extremely limited. However (the statement continued) in view of this incident and reports of similar explosions in the United States, the titanium melting plant would be temporarily closed down until appropriate safety precautions had been instituted.

Holiday Office Closing

The offices of William Rose Ltd. closed yesterday (Friday) for the 1956 annual vacation and will re-open on Monday, 16 July.

SCI 75th Annual Meeting

Achievements of Industrial Chemistry

THIS year's annual meeting of the Society of Chemical Industry which is being held in London next week (9 to 14 July) marks the Society's 75th anniversary. The lectures to be given are on the theme 'achievements of industrial chemistry' and speakers will review the advances made during the last 25 years in the application of science to chemical plant, processes and products.

Introductory Lecture

After an introductory lecture on 'Modern Methods of Research' by Dr. L. A. Jordan, C.B.E., director of the Paint Research Station, there will be two parallel series each of four lectures—one on the new products of industrial chemistry including plastics, artificial fibres and antibiotics while the other series will survey the tools of industrial chemistry including the use of metals and non-metals in plant construction as well as new manufacturing techniques and modern methods of recording and analysing the results of factory operations.

Nearly 1,000 members and guests from this country and overseas are expected to attend the meeting. On Tuesday, 10 July, delegates from 39 learned societies in Britain and abroad will present scrolls containing congratulatory addresses to mark the Society's 75th anniversary.

The headquarters of the Society during the meeting will be the Royal College of Science (Imperial College of Science & Technology), South Kensington.

An informal reception will be given on Monday evening by the London Section of the Society at Guildhall, where guests will be received by the Lord Mayor of London and the chairman of the London Section, Sir Charles Dodds, F.R.S., Courtauld Professor of Biochemistry in the University of London, and Lady Dodds.

The Society's annual dinner will be held at the Dorchester Hotel, Park Lane W1, on Wednesday evening. A reception will be given by the Distillers Co. Ltd. on Thursday evening and on Friday evening a reception is to be given by ICI.

The following papers will be delivered:—'Modern Methods of Research' by Dr. L. A. Jordan; 'New Products of the Fermentation Industry' by Mr. J. J. Hastings, M.B.E., M.Sc., technical director of The Distillers Co. (Biochemicals) Ltd.; 'Hydrocarbon Macromolecules' by Dr. C. W. Bunn, M.A., D.Sc., F.Inst.P., of ICI plastics division; 'Metals as Plant Construction Materials' by Dr. N. P. Inglis, M.I.Chem.E., F.I.M., research director, metals division, ICI; 'Non-Metals as Plant Construction Materials' by Messrs. H. Cremer, C.B.E., M.Sc., and G. Brearley, B.Sc., consulting chemical engineers; 'Carbohydrate Macromolecules' by Professor M. Stacey, D.Sc., F.R.S., professor in charge of organic & biological chemistry, Birmingham; 'Nitrogen and Chlorine-Containing Macromolecules' by Dr. J. C. Bevington, M.A., of the chemistry department, Birmingham University; 'Manufacturing Techniques' by Mr. W. d'Leny, M.A., research director, Billingham Division, ICI; 'Records and Control' by Dr. G. M. Dyson, M.A., consultant in chemical engineering and scientific documentation.

A large programme of works visits and social excursions has also been arranged.

New Headquarters

Decoration of the Society's new headquarters at 14, 15 and 16 Belgrave Square, London SW1, is now well under way, and several administrative departments have moved in. The premises will give the Society its own meeting rooms and it will be able to conduct all its affairs under one roof. The accommodation will provide an elegant lecture theatre to seat about 150 people and a Council chamber and committee rooms. A room is also being reserved as a lounge for the use of members and visitors. A headquarters fund has been set up.

Wages & Hours of Labour

The 10th edition of *Time Rates of Wages and Hours of Labour*, dated 1 April 1956, compiled by the Ministry of Labour and National Service, was published on Friday 29 June 1956. The main tables in this new editjon show, for the more important industries and occupations, the minimum or standard time rates of wages, the dates from which these rates became operative, and the normal hours of labour.

Direct Reading Magnetometer

NEWPORT Instruments (Scientific & Mobile) Ltd., of Newport Pagnell, Bucks, have released details of the latest equipment in their range of products, namely, the direct reading magnetometer. This instrument has been designed to measure fields from 0.1 to 500 Oersteds with one probe. Selection of the range required is by means of a front panel switch. Applications will be in the transformer, radio and television fields. Further uses may exist in servo motor testing, for examining focusing electromagnets associated with particle accelerators and for experiments associated with measuring the earth's field. The instrument will be available in about eight weeks, and the anticipated selling price is £97 complete with one probe. Calibrating solenoid, if required, is £25. Complete data concerning the Magnetometer is given on leaflet G.1 which can be obtained from the sales department of the company.

ICI Plan £16 m Extension

IMPERIAL Chemical Industries Ltd. is to erect a third oil-cracking plant at Wilton in North Yorkshire. Wilton's first oil cracker came into operation in 1951 and the second will come on stream towards the end of this year. The new plant, which will be larger than the others, is scheduled to be ready early in 1959.

The main product of the new plant—ethylene—will be used to manufacture Alkathene, the ICI brand of polythene, and ICI have decided to build additional plant that will raise the company's capacity for Alkathene in this country to over 90,000 tons per annum.

Reducing River Pollution

IN a fresh move to cut down pollution in North-West rivers and streams, the Mersey River Board decided in Manchester on 22 June to empower their area committees to co-opt representatives from industry. In this way it is hoped to bring home more forcibly to industrialists the importance—and the difficulties—of keeping the waterways clean. An official of the board said some firms discharging waste material went to a lot of trouble to prevent pollution, but other firms often nullified their efforts. By inviting representatives of industry to sit on the area committees it might be possible to achieve more widespread co-operation.

Synthetic Rubber Plant

PERMISSION has been obtained from the local authorities for the building of a £5 million synthetic rubber plant at Fawley, Southampton. The new plant will be built by the International Rubber Co. which was formed last November by Dunlop Rubber, Goodyear Tyre and Rubber (Great Britain), Firestone Tyre and Rubber, and Michelin Tyre.

According to Mr. G. E. Beharrell, chairman of the new company and managing director of Dunlop Rubber, construction of the plant will begin this month and in two years it is expected to be producing 50,000 tons of synthetic rubber a year—a saving of $30 million on dollar exports.

The plant is being designed and planned by the chemical plants division of Blaw-Knox Co. of Pittsburgh.

US Oil Additives for UK

CHARLES Lennig & Co. (Great Britain) Ltd. announce that it has a plant under construction at Jarrow-on-Tyne for the manufacture of the Rohm & Haas line of lubricating oil additives. These products are marketed under the trade name Plexol in the UK and Europe (Acryloid in the US). They are copolymers of methacrylic esters and are the universal standard of the oil industry for viscosity index improvement and pour-point depression. Their major uses are in aircraft hydraulic fluids, automatic transmission fluids and motor oils, particularly the modern multi-grade type. Production from the new factory is expected early in 1957.

The Lennig firm is a totally owned subsidiary of the Rohm & Haas Co. of Philadelphia.

Electrofact Taken Over

ELECTROFACT Ltd., the British subsidiary company of Electrofact NV, Amsterdam, specialists in *p*H measurement and control, has been acquired by Hartley Electromotives Ltd. of London. The activities of Electrofact Ltd. have now been absorbed into the existing organization of its new owners and it will in future be known as the Electrofact Instrumentation Division of Hartley Electromotives Ltd.

The manufacture and design development of the Electrofact range of industrial and laboratory *p*H instruments has been transferred to the Hartley Electromotives factory at Monkmoor, Shrewsbury.

PEOPLE in the NEWS

MR. M. F. LINDSLEY, JR., has been appointed director of production for the explosives division of Olin Mathieson Chemical Corporation. Mr. Lindsley was formerly assistant to the president in charge of production of the King Powder Company, Cincinnati. He had been with that company 28 years before joining Olin Mathieson.

The following officers and members of council were elected at the recent annual general meeting of the Society of Cosmetic Chemists of Great Britain—: *president*: R. T. DOBSON; *vice-president*: J. PICKTHALL, F.R.I.C.; *honorary secretary*: F. RILEY; *honorary treasurer*: H. J. LOVELL; *council members*: H. W. HIBBOT, M.Sc., Ph.D., A.R.I.C.; H. HOLMES; K. G. JOHNSON, B.Sc., Ph.D., A.R.I.C.; A. W. MIDDLETON, B.Sc., Ph.D., F.R.I.C.; W. MITCHELL, B.Sc., Ph.D., F.R.I.C.; W. W. MYDDLETON, D.Sc MR. W. R. LITTLEJOHN, B.Sc., A.R.I.C., will become a member of council on taking over the duties of editor of the Society's journal in August.

DR. R. LESSING has accepted nomination on behalf of the executive council for election as the National Smoke Abatement Society's next president. He will succeed SIR ERNEST SMITH, whose term of office expires at the annual general meeting at Southport in October.

MR. J. S. LEACH, chairman of the board of directors of The Texas Company, will retire on 1 October. MR. AUGUSTUS C. LONG, president of the company, has been elected chairman and chief executive officer, and MR. JAMES W. FOLEY, executive vice-president will succeed Mr. Long as president. Mr. Leach, who has been with The Texas Company nearly 40 years, will continue as a member of the board of directors.

DR. HELMUT WAKEHAM, F.T.I., director of research at the Textile Research Institute, Princeton, New Jersey, US, has been granted a two year leave of absence from that position to assume the post of director of the Ahmedebad Textile Industry Research Association in India. Dr. Wakeham will undertake this work in order to co-ordinate and direct the programme at ATIRA and to prepare the way for a permanent Indian director of the Laboratory.

MR. JOHN S. V. ANDREWS, works director, Mersey Cable Works Ltd., Lancs, has been appointed chief planning engineer at the Sunderland headquarters of James A. Jobling & Co. Ltd., manufacturers of scientific and laboratory apparatus.

MR. GEOFFREY LOASBY, B.Sc., F.R.I.C., F.T.I., chairman of council of the Textile Institute, has just returned from a business trip, during which he met members of the Textile Institute in Johannesburg, Calcutta, Bombay and Melbourne, and lectured on 'Modern Developments in Textile Technology'.

The Council of the Royal Society of Arts has awarded its Bicentenary Medal for 1956 to DR. WALTER JOHN WORBOYS, chairman of the Council of Industrial Design, for his outstanding services to the promotion of industrial design, particularly in connection with the establishment of the Design Centre,

Dr. W. J. Worboys who has been awarded the Royal Society of Arts Bicentenary Medal for 1956

which was opened by the Duke of Edinburgh in April. Dr. Worboys is a director of Imperial Chemical Industries Ltd., vice-president of the Association of British Chemical Manufacturers, and a member of council of the Society of Chemical Industry.

MR. A. E. CHESTER, of Picton Avenue, Runcorn, who has retired after 36 years service at the ICI Salt Division, Runcorn, has been presented with a long-service certificate, a chiming clock, and a spring interior mattress. The presentation was made by DR. J. F. LEHMANN, works manager.

Estimation of Vitamin B_1

COMPARISONS of the fluorimetric method and the British Pharmacopœia method of estimating vitamin B_1 are made in the Annual Report (1955) of the Ovaltine Research Laboratories. The fluorimetric method, widely used in food analysis, was found to give satisfactory agreement with the official chemical method and with the spectrophotometric method on vitamin B_1 solutions in ampoules even after prolonged exposure to light and intensive autoclaving.

The more drastic conditions of baking, in which serious losses of B_1 can occur, were next studied. It was found that after prolonged baking the fluorimetric method gave the best results. The conclusion is drawn that the fluorimetric method gives the most satisfactory results under all conditions.

Other work being carried out by the Ovaltine Research Laboratories includes a study of the role of vitamin B_{12} in human nutrition (in collaboration with the Laboratory of Human Nutrition and the Radcliffe Infirmary, Oxford), and an investigation of cyanide and thiocyanate metabolism.

Determination of Anti-knock

AN X-RAY absorptiometer for the determination of tetraethyl lead in petrol is described in an article by J. F. Brown and R. J. Weir of ICI Ltd., Billingham, in the June issue of the *Journal of Scientific Instruments*.

The absorptiometer consists of three main parts, a low-power X-ray set, an absorption cell and an X-ray detector. The X-ray set is built round a Ferranti type B100 X-ray tube, a small radiation-cooled triode type with a maximum anode rating of 50kV, 25W.

The tube anode supply is 25kV which was chosen for two reasons: first the absorption coefficients of carbon and hydrogen are about the same at this voltage and hence the calibration of the apparatus will not be affected by small changes in the composition of the base petrol; and second a simple and inexpensive generator for 25kV is available for projection television tubes.

Absorption cells are made in blocks of five from rolled silicon aluminium plate. The X-ray detector is a nickel killed zinc sulphide phosphor with an emission maximum at about 4,000Å when excited by low energy X-rays.

Liaison & Advisory Unit

Scheme Launched by BFMIRA

A SCHEME which should enable manufacturers in all parts of the country to make the fullest use of scientific progress in the food industry has been launched by the British Food Manufacturing Industries Research Association.

It has set up at its laboratories at Leatherhead, Surrey, a completely self-contained liaison and advisory unit which will assist both members and non-members of the Association alike. Non-members will be offered a first 'free sample' of the unit's services.

Advice to Food Factories

Giving details of the new development, Dr. F. H. Banfield, the Director of Research, said additional scientific staff who had been recruited would tour the country visiting food factories to offer their help.

In charge of the unit was Mr. H. G. Harvey, one of the Association's senior research workers with a wide experience in the factory application of food science.

'The scheme is an extension of our previous work through the more intensive use of the personal link between scientist and producer,' said Dr. Banfield. 'By assisting non-members to apply scientific principles generally known, and thus increase their efficiency, we hope to show them the benefits to be derived from full membership, when they would have access to the greater fund of specialized knowledge.

'We shall also aim to give greater help to our present members by assisting them to translate the results of our research into practical use.'

Mr. Harvey gave an outline of the groundwork which had been done in preparing the plans for the Unit. No fewer than 64 factories of member firms had been visited to establish the best means of assisting the industry.

He particularly stressed the advantages which small firms not employing chemists could derive. For instance, specifications with which raw materials should comply to ensure their suitability for any particular processing could be provided on request. The Association could then make checks on samples, at intervals, in its laboratories.

A study by Dr. A. Kofler, N. Delande & Dr. A. Lacourt
(Microchemistry Department, Brussels University)

Glutamic Acid Enantiomorphs

Thermomicro Methods of Identification

BECAUSE enantiomorphs can have totally different biogenic activities there is an urgent need for sure and rapid identification tests. It is well known that *l*-ascorbic acid has biochemical activity while the *d* isomer is inactive. In the case of pantothenic acid it is the *d* isomer that is active.

Any isomer can at present be identified on a single crystal by thermomicro methods (**1**) and the eutectic melting temperature (**2**). These tests are specific and of general application and have been adapted to glutamic acids.

New Test is Simple

The new recommended test is even simpler; it is carried out at room temperature and needs only pure samples of *d*, *l*, and *dl* individuals. It is based on the totally different crystallographic aspects of the enantiomorphs and racemic glutamic acid. This difference is due to the fact that *dl*-glutamic acid always crystallizes with water, whereas the enantiomorphs are anhydrous. This explains the difference in solubility in concentrated alcohol between the racemate and the enantiomorphs.

Samples of *dl*-glutamic acid supplied by L. Light & Co. Ltd. appear as a mixture of bright transparent and opaque prismatic needles. When slowly heated these emit water vapour, recognizable when heated under paraffin (**1**), and when all the water is given up the crystals become opaque. Aqueous fusion occurs between 105 and 110°C, and the real melting point lies between 181 and 184°C accompanied by decomposition.

When heated in concentrated alcohol the crystals first dissolve then precipitate, when cooled, aggregates of thick, transparent needles of *dl*-glutamic acid, together with flat, diamond shaped crystals having the characteristics of form I of the anhydrous enantiomorphs.

Normally, *dl*-glutamic acid is a hydrate and should be recrystallized from dilute alcohol so as not to remove the water of crystallization.

d-Glutamic acid is always anhydrous (form I) and melts between 188 and 192°C when the temperature is raised at the rate of 4°C per minute. Recrystallized from dilute alcohol it gives the flat type of crystal that has already been described (**3**).

l-Glutamic acid melts from 192 to 196°C with decomposition, when the temperature rise is 4°C per minute. It has all the characteristics of an anhydrous substance, but shows two types of flat crystals (diamond and hexagonal shaped) both of the rhombic system:—

(a) Prisms with pyrimidal tops and refractive indices of about 1.50 and 1.62, known as form II (**4**).

(b) Hexagonal tablets with a sharp characteristic angle of 73° and refractive indices of about 1.53 and 1.62. These have not yet been described and should be considered as form I of *l*-glutamic acid.

This form I grows in form II when the latter is heated at 140°C. Prisms change themselves into fine opaque aggregates at this temperature.

Samples from L. Light & Co. contained only form I, whereas the material supplied by Merck contained both forms.

Recrystallization at room temperatures of mixtures of equal quantities of *d*- and *l*-glutamic acids from dilute alcohol gives needles of *dl*-glutamic acid on which all the above mentioned modifications have been observed.

Melting of Mixture

A mixture of equal quantities of *d*- and *l*-glutamic acids melts between 182 and 184°C, showing the same melting interval as that of *dl*-glutamic acid itself. This proves that the acid is completely dehydrated when it melts. From this fact it can be presumed that the melting diagram of these mixtures will fail to give information about their percentage composition of *d*-, *l*- and *dl*-glutamic acids.

The new identification test of an unknown glutamic acid can be summarized as follows:—

(a) Crystal aspect under microscope and behaviour on heating block, with or without liquid paraffin, identifies *dl*-gutamic acid (hydrated) enantiomorphs.

(b) Recrystallization of one crystal at room temperature and at 60°C in concentrated alcohol will give the identity of *dl*-glutamic acid. One should also recrystallize a crystal in dilute alcohol to make sure of the recovery of *dl*-glutamic acid.

(c) When (a) and (b) give negative results, a mixture of the unknown crystal is made at room temperature successively with a sample of each enantiomorph. A drop of dilute alcohol is used for that purpose. After the solvent has evaporated the preparation is again examined:—

(1) When addition of *d*-glutamic acid leads to typical hydrated needles of *dl*-glutamic acid, then the unknown is *l*-glutamic acid.

(2) When it is *l*-glutamic acid that has to be added to achieve this result, then the unknown is *d*-glutamic acid.

By this simple method of mixing the pure *d* and *l* forms with the crystals of the sample it is possible to identify separately both enantiomorphs of glutamic acid, operating on a crystal or on a droplet or on a sublimate from a chromatographic spot on paper.

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(3) 'Beilstein': IV, pp. 537 & 540.
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Welding of High-Nickel Alloys

A NEW 16 mm. sound film in colour has been produced by Henry Wiggin & Co. Ltd. to instruct welders and others in the techniques of joining the various wrought nickel alloys which this country supplies. While the film is concerned mainly with Monel, nickel and Inconel it includes reference to Nimonic 75 sheet fabrication and also to Corronel B, a corrosion resistant alloy of recent introduction. The film is available on loan on application to the publicity department, Henry Wiggin & Co. Ltd., Thames House, Millbank, London SW1.

More Fish—Less Waste

Antibiotics as Preservatives Discussed

THE use of antibiotics (Aureomycin) to double the life of fish after catching, improve quality, and also double the amount of fish available in the world, was discussed at Rotterdam on 25 June.

Under the chairmanship of Dr. G. A. Reay, superintendent of the Torry Research Station in Scotland, scientists from the World Food and Agriculture Organization and from the Netherlands, Algeria, Belgium, Canada, Denmark, Ecuador, El Salvador, France, Germany, Iceland, Ireland, Monaco, Nicaragua, Norway, Portugal, Sweden, South Africa, United Kingdom, United States and Uruguay met for a week long conference.

Experiments in Many Lands

Papers read at the conference dealt mainly with experiments in Canada, the United States, Japan and Europe to determine the effect of antibiotics as a fish preservative.

The most detailed work in this connection has so far been carried out by Mr. H. L. A. Tarr of the Canadian Fisheries Research Board Station at Vancouver. Mr. Tarr's paper covers work carried out by his Station in the past three years using 'Acronize block ice'—a method developed by the Lederle Laboratories Division of American Cyanamid Products Ltd. By this method Acronize, a derivative of Aureomycin, is mixed in with the ice which is spread over the fish in the holds of vessels after catching.

As a result of his experiments, Mr. Tarr found that fish stored in Acronized ice kept its freshness for double the normal time.

Dr. J. M. Shewan of the Torry Research Station read a paper on the recent experiments he carried out on fish treated with Acronized ice aboard the research trawler *Sir William Hardy*.

In these experiments Dr. Shewan compared the treated fish with fish stored normally in ice at periods of 7, 14 and 22 days after catching. In all cases again it was found that the treated fish was in better condition and had deteriorated less than fish stored normally.

At present, however, the British Food and Drugs Act does not permit the use of such a preservative.

Pyrethrum Development

Control of Cockroaches

A DEVELOPMENT in the use of pyrethrum synergized with piperonyl butoxide to control cockroaches has recently been pioneered. Pyrethrum has always been effective for the control of cockroaches but by taking advantage of new formulations and modern methods of application, it has been possible to obtain spectacular control more quickly and effectively.

Experiments have been carried out with synergized pyrethrum formulations so that a spray was applied in the form of a fine mist generated by the Microsol Rotating Disc Aerosol machine. Pyrethrum has always had an irritant effect on cockroaches, minute quantities stirring them into activity. With this point in mind, tests were made and these proved that cockroaches could be reached even in inaccessible places such as behind pipes and wall fixtures, activating them to the extent that they came out into the open. By maintaining the insecticidal mist, the cockroaches were continually activated and so picked up sufficient of the insecticide to prove fatal.

Number of Applications

The number of applications of synergized pyrethrum, usually in an oil base, necessary for complete control will depend upon the type of premises, but two or three applications should be sufficient in normal cases.

The great advantage of using such a spray is that it may be used in kitchens and anywhere where food is handled or processed with little or no hazard to health, or fear of building up a poisoning or tainting deposit.

Pyrethrum-piperonyl butoxide has also been used as an insecticide for the protection of bacon against blowflies. The insecticide is mixed with the pea meal, a dust made from dried peas, which is sprayed on to the bacon before smoking. This method of control of blowflies has been adopted by a large number of firms and has been found to reduce blowfly attack on bacon to negligible proportions.

The American Department of Agriculture has recently purchased enough pyrethrum-piperonyl butoxide emulsion concentrate to treat 10 million bushels of Government-owned grain and has indicated its intention to carry the programme of grain disinfestation forward as rapidly as possible over the balance of this season. In addition to this, the Government contracted with private pest control operators to treat 20 shiploads of grain, each containing about 230,000 bushels.

DECHEMA Report Published

THE 1955 annual report of the DECHEMA. Deutsche Gesellschaft für chemisches Apparatewesen, records that approximately DM 200,000 was expended during the year for purposes of scientific research. This sum included grants made from the Max Buchner Foundation, which is managed on an honorary basis by the DECHEMA. The section of the report dealing with the activities of the 'DECHEMA-Institut für Apparate-und Stoffkunde', proves that this Institute, whose work is solely of a documentary nature in the chemical apparatus and equipment field, is developing along sound lines.

Another section of the report gives a final summary of the results of the ACHEMA XI Chemical Apparatus and Equipment Congress and Exhibition held in Frankfurt am Main from 14 to 22 May 1955. The figures recorded furnish conclusive evidence that this Congress stands in a class by itself and that it has won the approbation of the world. In connection with the Max Buchner Foundation, it is stated that 15 research projects were financed by this body.

The report closes with a section containing a report on the first Congress of the European Federation for Chemical Engineering, which was held in 1955. The section also includes an index of DIN Standards Sheets which have been drawn up with the co-operation of the DECHEMA. A careful perusal of this report is recommended and interested readers can obtain copies free of charge as long as the supply lasts. Application should be made to the DECHEMA Deutsche Gesellschaft für chemisches Apparatewesen, Frankfurt am Main W7, Postfach, Germany.

Soviet Trade Delegation

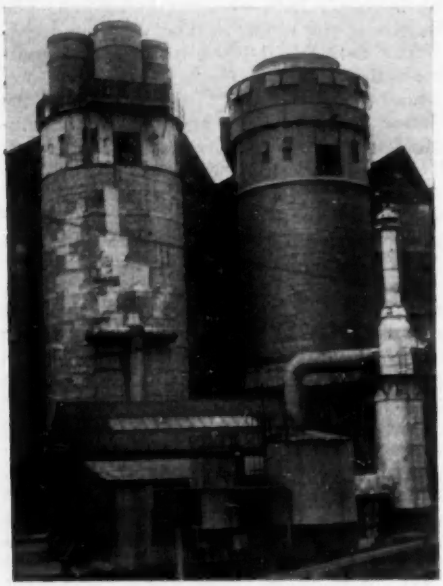
Soviet delegates arrived in this country this week in connection with the purchasing programme submitted by Mr. Bulganin and Mr. Khruschev during their visit to this country last April. According to the Board of Trade, firms who are interested in the Soviet purchasing programme should contact the Soviet Trade Delegation, 32 Highgate West Hill, London N6.

Drying Tower Protection

Problem Solved at Warrington

THE problem of protecting the exterior steel surfaces of drying towers at the soapless detergent powder plant of Joseph Crosfield & Sons Ltd. at Warrington has been solved by the use of a special Epikote resin based system.

The manufacturing process involves a stage in which constituents of the detergent in the form of a slurry are dried to a powder. This drying operation is carried out in a steel tower about 100 ft. high and 30 ft. dia.



This picture shows the contrast between the two towers, both of which have had 18 months' exposure. The one on the left was coated with conventional paint, and the one on the right with the Epikote resin based system

In this tower the slurry is spray dried in a current of very hot air. The moisture laden air from this process, at a temperature of about 100° C, is freed from dust by passage through a dry collector system and is then exhausted from the top of a tower through a final wet scrubbing system. The combination of scrubbing liquor, high temperature and humidity creates conditions at the top of the tower which made the protection of the steel surfaces in the immediate vicinity of the tower discharge a difficult problem.

Various types of conventional protective paints have been used on this steelwork, but without success. After investigation, an Epikote resin based system provided by Mody & Co. Ltd., Warrington, was tried out on the tower. This system incorporates Anotect—a one-pack air drying brushing zinc primer—and two finishing coats of Flexakote, which is an amine-cured Epikote resin based paint.

After 18 months' service, this system is reported to be still providing excellent protection under difficult process conditions and in the presence of an industrial atmosphere. By comparison, an adjacent tower which has a conventional coating is showing obvious signs of paint breakdown, although in this instance the tower is used for a less arduous duty.

New Polythene Plants

CONSTRUCTION of two new plants for the production of low-pressure polythene was announced on 26 June by Union Carbide & Carbon Corporation. The two plants, located at Institute, West Virginia, and Seadrift, Texas, with a combined rated annual capacity of 55 million pounds, are scheduled for completion next year.

The new facilities will be equipped to produce polythene by a number of new techniques, using not only the Ziegler and Phillips low-pressure processes, for both of which Union Carbide has been licensed, but also incorporating advanced technological improvements for olefin polymerization developed in Union Carbide's own laboratories and pilot plants. Polythene produced by low-pressure techniques differs from high-pressure polythene; it has additional strength, stiffness, and resistance to heat distortion and vapour transmission it is claimed.

'During the past few years,' Mr. Dial, president, Union Carbide, said, 'Bakelite Co., the plastics division of Union Carbide, has thoroughly surveyed the potential market for the newer low-pressure polythenes. These new polythene resins will make available a new family of plastic products that will broaden rather than replace the significant contributions that the original high-pressure polythene has already made to our economy.'

The unit at Institute, West Virginia, is scheduled for completion in the first quarter of 1957. The second unit at Seadrift, Texas, will be in production just a few months later.

From all Quarters

Textile Institute in Australia

It has been announced that a new section of the Textile Institute has been formed at Victoria, Australia. This was in accordance with the request of members of the Institute who attended a meeting at Melbourne in April.

Leipzig Fair Concession

Travellers from Great Britain going to the Leipzig Fair, which runs from 2 to 9 September, will get twice the normal number of East German marks for their travellers cheques—12.40 to the pound instead of 6.20. The concession will be available from 10 August to 21 September. Flights to Leipzig during the Fair, with very low through fares from London, the Midlands and the North, are being organized.

Canadian Chemical Expenditure

Chemical producers in Canada plan to spend $165 million in 1956 for new plants and machinery. The planned 1956 expenditures are about two and a half times those of 1955. Factory shipments of chemicals and allied products industries in 1955 reached a record high of $1,050 million.

OEEC & Dyestuffs Situation

The dyestuffs working party of the OEEC Chemical Products Committee has met in Paris, under the chairmanship of M. M. F. Brichet (Switzerland), to prepare a report on the situation in the dyestuffs sector during 1955 and the beginning of 1956. OEEC member countries produced in 1955 about 116,000 tons of dyestuffs (about 4 per cent less than in 1954). For the current year production is expected to be fairly stable. Trade declined during 1955, except trade with the United States, which increased in both directions.

Privately Owned Reactor

It is reported from Chicago that the first US private nuclear reactor for industrial research went into action there on 28 June. The 50,000 watt reactor is operated at the Armour Research Foundation of Illinois Institute of Technology for 24 industrial concerns. Its most frequent use will probably be the production of radio-isotopes to be used in the study of various materials.

Ethylene Glycol Plant for Puerto Rico

Plans for the construction of an ethylene glycol plant near Ponce, on the southern coast of Puerto Rico, to cost about $28.5 million were announced recently by Mr. Morse G. Dial, president of Union Carbide & Carbon Corporation. It is contemplated that the new plant will be constructed, owned, and operated by Union Carbide Caribe Inc., a wholly owned subsidiary of Union Carbide. An application for tax exemption under Puerto Rico's Industrial Incentive Act has been filed by Union Carbide Caribe Incorporated. Completion of the plant is scheduled to be about two years after the grant of the tax exemption.

Texaco's New Ammonia Plant

The Texas Company will start constructing an ammonia plant of 180 tons a day capacity at its Lockport, Ill., refinery, this autumn. It will have facilities for converting a substantial part of the ammonia to nitrogen solutions. Operations will start late in 1957. When completed, the ammonia plant will be Texaco's second major petrochemicals facility. The first, an additives plant at the company's largest refinery in Port Arthur, Texas, will begin production early next year.

Development in Bermuda

A Bill under which a Bermuda company may be incorporated to enable a large firm of American pharmaceutical manufacturers to set up a plant in the free port area on Ireland Island, has been passed by the Legislature. The advantages of incorporation in Bermuda include no income tax, no capital accounts or excess profits tax, ability to obtain customs remission orders for the import of machinery and raw materials, and suitable buildings at low rentals. In the Legislative Council, Mr. Bernard Gosling explained that the international business of the company—Merck Sharp and Dohme (International) Ltd.—would be handled from Bermuda.

Dechema-Monographs

Volume 26 of Dechema-Monographs Nos. 311-331, published by the DECHEMA Deutsche Gesellschaft für chemisches Apparatewesen, Frankfurt am Main, is now available, price DM 39 to members.

Particle Size of Powders

New Measuring Instruments

TWO photo-electric instruments have been introduced by Evans Electroselenium Ltd. for the measurement of the particle size of powders. These are the 'Eel' powder reflectometer and the 'Eel' photo-extinction sedimentometer.

The powder reflectometer will determine the specific surfaces of small powders (less than one micron) quickly and accurately by the 'Tinting Strength' method, and can be used by comparatively unskilled persons under any conditions of lighting or site.

Lens System

The instrument comprises a lens system, illuminated by a 6 volt 6 watt tungsten lamp to produce a parallel beam of light through a small hole in the centre of a barrier layer cell. The photo-cell and optical system are mounted together on a frame, to which is fitted a slide carrying two small thimbles for the powder under investigation.

Light reflected from the powder falls on the photo-cell, and the light, which has been scattered through a large angle by the powder surface, is collected by a highly polished conical mirror and is reflected by this on to the photo-cell. Thus, practically all light reflected by the sample is received by the cell. The output from the photo-cell is taken to a standard 'Eel' galvanometer unit which also incorporates a stabilizing transformer to provide a steady source of supply for the reflectometer lamp. A sensitivity control is provided to enable the reading to be set to 100 divisions on a standard white powder.

A filter wheel in the reflectometer head includes a neutral density filter having a transmission of approximately 10 per cent and this, in conjunction with the use of the clear aperture permits a tenfold increase in sensitivity for measurements on dark powders.

The photo-extinction sedimentometer enables particles in the sub-sieve range to be accurately sized. It consists of a rigid metal base plate on which is mounted a container made of heat-insulating material. This accommodates six optical cells to carry the sample solutions. These cells can be supplied with optical depths of up to 4 cm. and are normally 7.5 cm. high, thus permitting heights of up to 5 cm. from the point of measurement to the liquid surface. Taller cells may be employed, if required, by the use of an enlarged cover for the container. The optical system is assembled on a moving carriage which runs smoothly on machined surfaces on the base plate. The incident light beam is formed by a 12 v. 24 watt 'V' filament lamp, condenser lens and a system of stops. The emergent beam is also limited by stops and the solid angle subtended by the cell is 0.00022 solid radians.

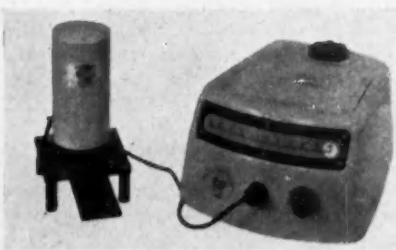
The carriage may be moved by rotation of a knurled hand wheel, and its position is indicated by a cursor and a series of index lines.

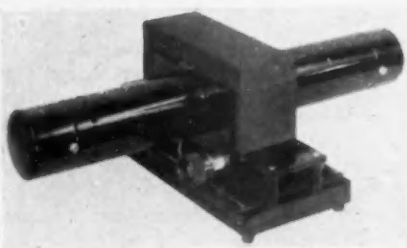
Spot Galvanometer

The spot galvanometer supplied for use with the instrument is provided with a potentiometer for sensitivity control and has an inverse logarithmic scale which provides direct readings of the extinction value of the solution.

A stabilizing transformer is available to supply the lamp or, alternatively, a large capacity accumulator may be used.

Two measuring instruments recently introduced by Evans Electroselenium Ltd. Left, the Powder Reflectometer which will determine the specific surfaces of small powders. Below, the Photo-Extinction Sedimentometer. This enables particles in the sub-sieve range to be accurately sized





Indian Newsletter

Our Own Correspondent Reports

THE report on the Second Five Year Plan submitted to the Indian Parliament recently envisages an outlay of Rs 48,000 million (£3,600 million) in the public sector and an investment of Rs 24,000 million (£1,800 million) in the private sector during the period 1956-61, and aims at a rapid industrialization of the country accompanied by a sizeable expansion in employment opportunities. The plan accords high priority for the development of basic industries, and a provision of Rs 6,900 million (£517.5 million) for large scale industries including mining has been made. These developments in industry and mining require large investments in transport especially in the development of railway facilities. A great deal of strengthening of the organizational and administrative personnel available as well as the adoption of expeditious procedures for taking decisions and executing them will be necessary. A beginning is to be made with the development of atomic energy. The increase in the output of goods and services over the plan period is to be secured through developments in both the public and private sectors, which will have to function in unison.

In the context the Government of India's New Industrial Policy Resolution, superceding the earlier one of 1948, had also been presented to the Parliament sometime back. The new policy resolution stresses the role and responsibility of the State in promoting development. The public sector is enlarged so as to include, 'all industries of basic and strategic importance or in the nature of public utility services'. The new solution gives two schedules of industries in terms of State responsibility.

Schedule A

Schedule A covers: arms and ammunition; atomic energy; iron and steel and heavy forgings and castings; heavy plant and machinery including electrical and hydraulic; coal and lignite; mineral oils; mining of iron, manganese, chrome ores, gypsum, gold and diamond; mining and processing of copper, lead, zinc, tin, molybdenum and wolfram; atomic minerals; aircraft; air and rail transport; telephones and wireless apparatus; and generation and distribution of electricity, and is to be entirely the State's responsibility.

In Schedule B are listed industries which will be progressively State owned, and private enterprise will also be expected to supplement the efforts of the State. This second schedule covers other minerals; aluminium and nonferrous metals; machine tools; ferro alloys; basic and intermediate products required by the chemical industries such as in the manufacture of drugs, dyestuffs and plastics; antibiotics; fertilizers; synthetic rubber; coal carbonization; chemical pulp; road and sea transport. The development of industries in the rest of the field will be left to the initiative of the private sector although it is open to the State to enter any field when necessary. While there has been some criticism in some quarters that the private sector has been neglected, it cannot be gainsaid that the enormous expenditures and resources needed for the plan on such a colossal scale could not be expected to come from private enterprise.

Future Progress

The chemical industry in India by and large has been in the private sector and it would be interesting to watch its progress in the years ahead especially in the light of targets laid down by the planners as shown in the table below:—

Industry		*Estimated Production* 1955-56	*Estimated requirements* 1960-61	*Targets for* 1960-61
Sulphuric acid	Tons	160,000	450,000	450,000
Caustic soda	,,	35,000	120,000	120,000
Soda ash	,,	80,000	250,000	250,000
Phosphatic fertilizer	,,	20,000	120,000	120,000
Calcium carbide	,,	3,000	24,000	24,000
Potassium chlorate	,,	1,500	4,200	4,000
Industrial explosives	,,	Nil	5,000	5,000
Carbon disulphide	,,	3,000	14,000	14,000
Carbon black	,,	200	12,000	8,000
Benzol recovery	Mil. gals.	1.5	—	9.0
Dyestuffs	Mil. lbs.	3.0	32.0	20.0
Intermediates	,,	—	—	44.0
Benzene hexachloride	Tons	700	2,000	2,000

In view of the remarkable progress registered by the Indian chemical industry in the past few years, it is hoped that its growth in the

Second Plan period will also be phenomenal.

It has been disclosed in the Indian Parliament recently that reconnaissance on the Madras beach had revealed the existence of appreciable quantities of monazite deposits. It might be recalled that last year as a result of a survey substantial quantities of this strategic mineral were reported from the Andhra coast. Atomic energy work is progressing fast in India. The first consignment of six tons of heavy water for use in India's atomic reactors, out of a total of 21 tons to be supplied by the United States under an agreement signed in March this year, arrived in Bombay and has been turned over to the Indian Atomic Energy Commission. In connection with the Canadian NRX atomic reactor which will be set up in India, 29 Indian scientists and 30 engineers have been selected to be deputed to Canada to obtain first hand experience and training in the designing of atomic reactors.

Contract With Russia

The Government of India has finalized a contract worth Rs 25 million (£1,875,000) with the Soviet Union and neighbouring countries for the supply of iron ore and the import of iron, steel and cement, according to the Joint Secretary, Ministry of Commerce and Industry. The contract is to include the export of 100,000 tons of iron ore to Poland and would expire in March 1957. There has of late been a heavy demand for Indian iron ore from Japan, Czechoslavakia and Austria. A Japanese delegation is likely to visit New Delhi shortly to finalize contracts with the Government of India for the supply of iron ores. Meanwhile, the Minister for Production, Government of India, has announced that a low shaft furnace for the exploitation of iron ore would be installed in the South shortly and that a pilot project had been sanctioned at the National Metallurgical Laboratory, Jamshedpur.

It is learnt that the Government of India have advised the State Government not to issue new mining leases for minerals like coal and manganese which come under Schedule A of the New Industrial Policy Resolution. However, it has been made clear that the existing owners will not be disturbed. It might be interesting in this context to record the recent judgment of the Patna High Court, which held that the State of Bihar was bound to renew the lease for mining Kyanite in Kharswan granted to the Indian Copper Corporation in 1926. The State alleged irregularities on the part of the company and consequently refused to renew the mining lease. While on the subject of mining, it may be added that the executive secretary of the Economic Commission for Asia and the Far East has announced that an aerial, geological and mineral survey of Asian countries would be made shortly under the auspices of the Commission.

India's first naphthol producing plant was switched on recently at the Amar Dye-chem factory at Kalyan, near Bombay. The plant is being constructed and operated in collaboration with Hilton Davis Corporation and incorporates automation equipment. The entire plant is scheduled to be opened in October.

It is understood that Godfrey I. Cabot Inc., are negotiating with the Government of India for establishing a carbon black plant in India, in co-operation with the National Industrial Development Corporation of the Government. The Indian consumption of carbon black is estimated at 7,200 tons which is met by imports.

Howitt Committee Report

THE Government has accepted the report of the Howitt Committee, which was set up to consider the Crown's powers over the use of technical information needed for fulfilling defence contracts. The committee, appointed last November by the President of the Board of Trade, consisted of Sir Harold Howitt, Sir Robert Barlow and Mr. John Megaw, Q.C. They recommended that the Crown should be given, subject to special safeguards, permanent powers enabling Government departments to authorize the use (but not the disclosure) of technical information when necessary for defence contracts and for this purpose to override agreements to the contrary. The essential differences between these permanent powers and the wider Emergency Powers which they will replace lay in the following factors: they are limited to production for defence (including civil defence); they provide for a period of three months for re-negotiation of agreements; provide for compensation and, on certain matters (including the amount of compensation), for appeal to the High Court. Only Ministers and senior officials will exercise the powers.

THE SYSTEMATIC IDENTIFICATION OF ORGANIC COMPOUNDS. By R. L. Shriner, R. C. Fuson and D. Y. Curtin. Fourth Edition. Chapman and Hall, Ltd., London. 1956. 48s.

The value of organic qualitative analysis in the training of chemists is not always recognized. Much less time is usually spent on it during the student's course than on inorganic analysis. In fact, there is a commonly held view that to be effective it should be systematized into tables and groups like its inorganic counterpart. Yet it is perhaps in this very seeming disorder that its virtue lies. The student is made to think for himself logically, he has to decide his own order of testing and draw his own conclusions, select his own confimatory tests or derivatives and go on until he has satisfied himself of the correctness of his conclusions.

This excellent book takes all these considerations into account. It is pointed out in the preface that identification stimulates the student's interest in organic chemistry and encourages him to depend on his own knowledge and ingenuity in solving problems. Organic identification is therefore an essential introduction to research. In spite of this, Chapter 2 contains a somewhat detailed procedure, adherence to which, the authors claim, will nearly always lessen the time required to complete the identification. Although this turns out to be more in the nature of a summary of how the student should go about the analysis, it is still not a clear enough guide. The principle of eliminating the most easily recognisable substances first is on the whole adhered to.

The rest of the book follows the usual pattern of preliminary examination, physical properties, elements' tests, solubility, derivatives, tables and mixture separation. The tables are very full and the chapters on classification tests and preparation of derivatives are particularly well written. The procedures are also modern. Here is a wealth of material and detail which makes the book invaluable for reference purposes. One notable feature is the amount of up-to-date and appropriately interposed theoretical discussion. However, some may question the need to devote several pages in a work like this to items such as the theory of acid and basic strength. Numerous references throughout the book encourage the student to consult textbooks, standard reference works and the original literature both on theory and on identification.

Chapter 12 on the solution of structural problems and chapter 13, which consists of problems, might well have been omitted entirely. This applies also to the questions and exercises in all chapters. On page 29 the student is asked why freezing points as ordinarily determined are not very reliable. It would be more helpful to omit such a question and include the answer in the text.

Apart from a very few minor questionable items this book is authoritative, complete and reliable.—M.C.

QUANTITATIVE CHEMICAL ANALYSIS. By R. B. Fischer. W. B. Saunders Company, Philadelphia and London. 1956. Pp. xii + 401. 38s 6d.

When deciding whether to recommend an elementary textbook by an American author, the reviewer is immediately up against the difficulty of the differences in British and American college courses and requirements. Many excellent books from America have to be rejected because they would be confusing to the student preparing for an examination at a British university.

This criticism does not apply to the present volume which is one of the most attractive textbooks of analysis that the reviewer has come across.

The introductory chapters consist of basic material which should be known to the student already, but the body of the book

reviews most satisfactorily the theory and practice of all the standard methods of quantitative analysis, starting with gravimetric methods and going on to volumetric methods, and ending with four chapters on optical and electrical methods. A disadvantage from the point of view of the laboratory worker is that practical procedures are not clearly demarcated from theory. Nevertheless, once the student gets to know the book he should have little difficulty in finding his way.

One final point: many textbooks (and this applies more to British than to American books) are unattractive in style and presentation. It is not realized that many students have to be encouraged in every possible way to read a book. A wise and careful choice of type faces and arrangement of paragraphs can reduce mental strain and aid in the understanding of a subject.—J.P.S.J.

HIGH SPEED AERODYNAMICS AND JET PROPULSION. Edited by B. Lewis, R. N. Pease and H. S. Taylor. Vol. II, COMBUSTION PROCESSES. Princeton University Press; London: Cumberlege, 1956. Pp. xv + 662. 84s.

The development of engines and combustion apparatus generally relies to a considerable extent upon accumulated experience and upon semi-empirical methods. During the last 15 years or so there has been an enormous acceleration in the rate of progress in all aspects of combustion research. The new information which has become available should lead ultimately to a better understanding of technical combustion processes of all kinds.

The book under review is one of a series which aims at providing a treatment of both the fundamental aerodynamic and propulsion problems of high speed flight and of the basic sciences related thereto. This volume on combustion processes deals at an advanced level with a wide range of topics of basic importance in propulsion systems.

Part 1 on thermodynamics includes three sub-sections, the first, by J. M. Carter, dealing with high temperature equilibrium including the calculation of equilibrium compositions and the determination of heat release and flame temperatures. D. Altman and J. M. Carter continue with a discussion of expansion processes and the thermodynamics of flow processes. S. R. Brinkley deals with computational methods in combustion calculations.

In part 2, H. S. Taylor provides a survey of the field of chemical kinetics and R. N. Pease deals with the kinetics of several important oxidation reactions including the hydrogen-oxygen and carbon monoxide-oxygen reactions and the oxidation of paraffin hydrocarbons.

Part 3 dealing with flame propagation includes a highly mathematical treatment of the mechanics of reaction continua by J. M. Richardson and S. R. Brinkley. This is followed by a discussion of combustion waves in non-turbulent explosive gases by B. Lewis and G. von Elbe which is, in fact, a condensed version of chapter 8 of their well-known book 'Combustion, Flames and Explosions of Gases' (Academic Press, 1951). A review of combustion waves in turbulent gases by B. Karlovitz follows and this part of the book is concluded by a discussion of diffusion flames by K. Wohl and C. W. Shipman.

In part 4, the combustion of liquid fuels including atomization, fuel sprays and the evaporation and combustion of fuel droplets is dealt with by J. P. Longwell, while M. Gerstein and K. P. Coffin consider the combustion of solid fuels. D. Altman and S. S. Penner survey the ignition phenomena in bipropellent and monopropellent systems; solid propellents are discussed by C. Huggett.

A. R. Ubbelohde and J. Copp consider, in part 5, both the experimental methods and physical chemistry of detonation processes in gases, liquids and solids.

Part 6 comprises a short discussion, by H. Soodak, of energy production by nuclear reactions.

Each section of the book is provided with a comprehensive list of cited references and in some cases a bibliography. There are over 150 figures in the text and 16 pages of plates. *Combustion Processes* will prove of considerable value to chemists, physicists and engineers as a standard work in this rapidly developing field. It possesses the advantage of being a compilation of reviews by leading authorities. It suffers from the disadvantage that the bulk of the first drafts were received for editing in 1951 and most of the revised copy late in 1952. The Sixth International Combustion Symposium to be held in August will undoubtedly provide much new information and the papers presented will need to be studied by those wishing to be quite up to date in any particular aspect of combustion research.—R.L.

Review of Organic Phosphorus Insecticides

VI Parts—Part V : Spectrophotometric Methods of Analysis

by R. G. BARRADAS, B.Sc., A.R.I.C., A.R.T.C., M.R.S.H.
(Government Laboratory, Hong Kong)

PART II of this review described essentially those methods which involved visual colorimetry, such as those methods which required the matching of colours using any of the well-known visual comparison procedures, for example, the Duboscq colorimeter, Hehner cylinder, Nessler tube or the Hellige comparator. In this section, methods involving the measurment of absorbancies in ultra-violet, visible, and infra-red light are discussed. In general there is not a sharp sub-division between colorimetry and spectrophotometry. Strictly, the term absorption spectroscopy implies the dispersion of the incident or transmitted light and the measurement of wavelengths.

Absorption spectroscopy in the ultra-violet and visible light regions was among the earliest physical methods to be employed in the analysis of organic compounds. The rapid growth of ultra-violet absorption spectroscopy as a popular analytical tool dates from the period 1920-1930. The advent of precision engineered commercial spectrophotometers has resulted in a tremendous expansion of activity in this field, which shows no sign of having reached its limit and which is being aided by continual technical improvements. The collation of light absorption data has now become routine practice, comparable to that of elemental analysis, in many laboratories.

Infra-red Region

The infra-red region is perhaps the most instructive of all the regions of the electromagnetic spectrum, because it can yield the most information concerning the structure of organic molecules. Problems of purity, identity, gross structural features, and the many points of fine structural detail can readily be solved by the use of infra-red spectroscopical methods, and often much faster than by any other analytical methods. There are limitations to the technique, especially when the molecules being studied are very highly complex and of high molecular weight.

The utility of infra-red methods in determining structure is based on the fact that many molecular groups give rise to characteristic absorption frequencies and intensities which are only but slightly affected by other parts of the molecule. All organic and some inorganic structures absorb in the infra-red region, but in the ultra-violet selective absorption is mostly restricted to certain types of unsaturated systems. Despite the overall usefulness of infra-red spectroscopy, very little work has been published on the analytical aspects of infra-red studies of organic phosphorus insecticides. The bulk of the literature indicates that the trend at present is towards ultra-violet spectrophotometric investigations.

Parathion Poisoning

Mountain, Zlotolow, and O'Conor (**74**) described a determination of *p*-nitrophenol in parathion piosoning cases. The urine from persons suffering from parathion poisoning was subsequently extracted with the same disodium hydrogen phosphate. This mixture was then centrifuged. The supernatant liquid was removed, acidified with a solution of citric acid, and extracted with a mixture of ether and *iso*amyl alcohol. The parathion in the extract was converted to sodium *p*-nitrophenolate by hydrolysis with sodium hydroxide, neutralized with citric acid, and then reduced to *p*-aminophenol with titanous chloride. The *p*-aminophenol was subsequently extracted with the same mixture of *iso*amyl alcohol and ether at a *p*H of 7-8. It was then converted to the indophenol dye and determined spectrophotometrically. The lead acetate treatment and centrifuging were necessary only with urine and tissue samples suspected of containing parathion.

The Averell and Norris (**7**) method for the determination of parathion and other organic phosphorus insecticides can be regarded either as a colorimetric or spectro-

Part IV of this review was published in THE CHEMICAL AGE *of 23 June 1956.*

photometric method. Bazzo (**75**) used the Averell and Norris method for the determination of parathion in samples of olives and of olive oil obtained from trees treated with parathion insecticide formulations. The intense magenta colour of the dyestuff obtained by coupling *p*-aminophenol with N-(1-naphthyl-ethylenediamine) was measured spectrophotometrically at 555 mμ. Wilson, Baier, Genung, and Mullowney (**76**) introduced a semi-micro modification of the Averell and Norris method for the spectrophotometric determination of parathion at 555 mμ. The authors recommended the use of isopropyl alcohol instead of ethyl alcohol.

Parathion in Air Samples

Hirt and Gisclard (**77**) determined parathion in air samples by ultra-violet absorption spectroscopy. The method offers a sensitive means of determining the concentration of parathion in the atmosphere, which can be used for the monitoring of manufacturing and packaging operations. It is also very useful for such laboratory studies as vapour pressure and vapour phase toxicity. The presence of the strongly chromophoric *p*-nitrophenyl grouping in the parathion molecule gives rise to an intense, broad absorption band in the near ultra-violet region with its maximum near 274 mμ.

The sample of air to be tested was passed through ethyl alcohol contained in a specially designed air sampler or by the Midget impinger, which has found widespread use in the sampling of air in mines. The alcohol extracts parathion from the air sample, and the alcoholic solution was submitted to spectrophotometric investigation in a Beckman quartz photoelectric spectrophotometer. The presence of parathion was established from the shape of the absorption curve, and the concentration was then calculated from the Beer's law equation.

The ultra-violet absorption curve showed the presence of aromatic compounds other than parathion, which were likely to be present in the alcoholic solution at the time of examination. For this reason, great care was exercised to avoid such contamination. This method was successfully applied to the determination of parathion present either as vapour, in mist or air-born impregnated dust. The authors recommended that care should also be exercised in the interpretation of spectral curves. They stated that any absorption which was not recognizable as that of the compounds being determined was not calculated and reported as such. In such cases they suggested that the amount calculated might be reported as the maximum amount possibly present.

Ketelaar and Hellingman (**78**) described a general method for the determination of parathion and methyl parathion in technical preparations and formulations, both liquid and solid. The method was based on the saponification of the insecticide, followed by the colorimetric determination of the *p*-nitrophenol which was formed. *p*-Nitrophenol was converted by sodium hydroxide to sodium *p*-nitrophenolate, the *p*-nitrophenolate ion showing a very strong absorption in the ultra-violet region with a maximum at 405 mμ. This absorption was used in the spectrophotometric determination. The molecular extinction coefficient at a wave length of 405 mμ was about 20,000 $cm.^{-1}$, which was approximately one half the value obtained for the magneta dye used in the Averell and Norris method. This method detected approximately 10 to 20 microgrammes of the insecticide.

Various common impurities of technical parathion were also investigated. The authors found that removal of the impurity, or correction in the final calculations, had to be reckoned for the presence of free *p*-nitrophenetol, 0-ethyl 0,0-bis(*p*-nitrophenyl) thiophosphate, *p*-nitrophenetol, and 0,0,0-triethyl thiophosphate.

Special Procedure

The dimethyl analogue of parathion, methyl parathion, must be accounted for by a special procedure when present in parathion formulations. The two substances may be distinguished from each other by measuring the rate of hydrolysis in an alkaline medium. It was found that the rate of hydrolysis for methyl parathion was 4.3 times higher than parathion. Another method of distinction was to compare the infra-red absorption spectra in the region of 10-12.7 mμ. This latter method was not found to be easily applied to commercial liquid preparations of the insecticides.

The results obtained in the analysis of pure methyl parathion by boiling with sodium hydroxide in the same way as for parathion were found to be low and not reproducible. The authors recommended that methyl parathion be saponified at room temperature, when the results became more true to expectations. Ketelaar and Hellingman per-

formed their experiments on a Beckman spectrophotometer, and recorded that the measurement error was about 0.5 per cent. They concluded that their method was generally as accurate as any colorimetric method.

Sokol (**79**) made extensive studies with a Hilger spectrophotometer of the absorption properties of compounds present in technical parathion and methyl parathion. An examination of the ultra-violet absorption spectra of the various compounds present showed that the curves of 0,0-diethyl 0-*p*-nitrophenyl thiophosphate, *p*-nitrophenol, and 0,0,0-triethyl thiophosphate did not overlap and could be used for their quantitative determination. 0-ethyl 0,0-bis (*p*-nitrophenyl) thiophosphate, a compound which occurs with technical parathion is a sparingly soluble substance and can be readily precipitated. Other impurities like *p*-nitrophenetol, 0,S-diethyl 0-*p*-nitrophenyl thiophosphate, and 0,0-dimethyl 0-*o*-nitrophenyl thiophosphate occurred in insignificantly small amounts, and did not give rise to any appreciable interference. This confirmed some of the findings of Ketelaar and Hellingman in their studies of similar impurities.

Sokol measured the absorption spectrum of the compounds over the range 250-350 mμ. The disadvantage of Sokol's method was that mixtures containing *p*-nitrophenetol, 0,S-diethyl 0-*p*-nitrophenyl thiophosphate, and 0,0-dimethyl 0-*o*-nitrophenyl thiophosphate had similar absorption curves, and the curve of *p*-nitrophenetol was closely similar to that of *p*-nitrophenol. The same method with but slight modifications could be applied to the ultra-violet spectrophotometric determination of methyl parathion.

Anticholinesterase Activity

Payton (**80**) reported on the correlation of the anticholinesterase activity with the ultra-violet studies of parathion. The anticholinesterase activity originally reported for parathion was now considered to have been due to contamination by 0,S-diethyl *p*-nitrophenyl thiophosphate, diethyl S-*p*-nitrophenyl thiophosphate, or diethyl-*p*-nitrophenyl phosphate. When parathion emulsions or solutions were exposed to ultra-violet light of 185 to 400 mμ the anticholinesterase activity became progressively higher with the length of exposure. It was suggested that the parathion was being converted to an active isomer.

One of the more recent spectrophotometric identifications and determinations of parathion was reported by Biggs (**81**) who made direct absorptiometric measurements at 276 mμ of an ethanolic solution of parathion using a Uvispek spectrophotometer. This was checked by the hydrolysis of the same parathion to *p*-nitrophenol and the determination of the *p*-nitrophenol in an alkaline solution at 408 mμ. An allowance was made for any free *p*-nitrophenol originally present in the parathion by determining the absorption at 408 mμ before hydrolysis.

Post-Mortem Materials

The hydrolysis was effected by heating the solution in an alcoholic caustic potash solution at 100° C for three hours. For the determination of parathion in post-mortem materials, Biggs used *n*-hexane which he claimed gave a clean extraction. The concentration of this solution could be determined spectrophotometrically at 268 mμ. As confirmation of this the *n*-hexane extract was evaporated to dryness with a solution of potassium hydroxide under reduced pressure at 50°C in order to remove the solvent. The residue was dissolved in ethyl alcohol and hydrolysed, and the resulting *p*-nitrophenol determined. The spectrophotometric behaviour of parathion before and after hydrolysis also served for its qualitative identification. Biggs stated that as little as 0.1 milligramme in 10 ml. could be determined by the direct measurement of the characteristic absorption spectrum.

The spectrophotometric determination of Chlorothion was described by Kolbezen and Barkley (**26**). Brief mention of this method was made in Part II of this review when it was included as a colorimetric method of analysis. Further details from the ultra-violet absorption point of view are now discussed. Kolbezen and Barkley modified the well-known Averell and Norris method for the determination of parathion and other thiophosphoric esters, and they applied it to the determination of Chlorothion and of Chlorothion residues in milk. Milk fat and other interfering substances had to be removed before the material was reduced and the resulting amino-compound diazotized, and coupled to give the characteristic magenta coloured dye.

The authors reported that concentrations of more than 0.1 part per million in 500

ml. of milk could be determined spectrophotometrically, and that 0.02 to 0.1 part per million could be determined by visual comparison in Nessler tubes. The absorption maximum was obtained at 545 mμ, and Beer's law was obeyed with concentrations of 20-300 microgrammes of Chlorothion per 100 ml. of solution.

Determination of Diazinon

The analytical laboratories of J. R. Geigy SA, Basle (**82**), have produced a very simple and yet elegant method for the determination of small amounts of Diazinon. The sample to be tested was extracted with petroleum ether, neutralized with sodium hydroxide, and then washed with a dilute hydrochloric acid solution to remove undesirable impurities. The extract was then hydrolysed with concentrated hydrobromic acid solution. The P = S group of the Diazinon molecule was attacked and the sulphur was liberated in the form of hydrogen sulphide. The gas was absorbed in a zinc acetate solution. A solution of *p*-amino dimethyl aniline hydrochloride in hydrochloric acid, and an aqueous solution of ferric chloride were added to the zinc sulphide solution. This resulted in the formation of methylene blue, the absorbancy of which was determined spectrophotometically using a Beckman instrument.

Derkosch, Jansch, Leutner, and Mayer (**83**) described their ultra-violet and infra-red spectrophotometric studies of parathion and methyl parathion. Both of these insecticides were isolated from food residues or viscera in toxicological investigations by steam distillation. If the compound was present in large quantities it could be detected by examining the infra-red molecular vibration frequency of an ether extract of the steam distillate. Infra-red spectra permitted the distinction between parathion and methyl parathion. Ultra-violet spectra did not allow the distinction of these two substances. The advantage of ultra-violet over infra-red absorptiometry lay in the fact that small quantities of parathion could be detected in the steam distillate.

The authors reported the results of an interesting fatal case where the stomach contents revealed 0.29 microgramme of parathion. The remains of unconsumed food contained 8.14 milligrammes. More recently Derkosch and Mayer (**84**) reported further progress in the detection and determination of parathion and methyl parathion in forensic specimens. They separated the insecticides from biological materials by steam distillation, and extracted the distillate with ether. They measured the concentration of the insecticide residue in ethanol by ultra-violet absorption spectrophotometry. They reported that computational elimination of the interfering materials was easier at low concentrations of the insecticide.

The infra-red spectra of organic phosphorus compounds were studied by Gore (**85**). He examined 34 organic phosphorus compounds, and on the basis of their respective spectra he concluded that the P=O linkage absorbed strongly in the region of 1250-1300 cm.$^{-1}$. The P=S link appeared in general to be a weak and poorly characterized absorber in the infra-red region, with a possibly weak absorption near 650 cm.$^{-1}$.

Infra-red absorption spectra are widely used in many laboratories for the indentification of unknown materials, but this type of work is seldom published. Useful spectral data on organic phosphorus compounds has been made available in the publication of Bellamy (**86**).

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Prefabricated Factory Buildings

Prefabricated, reinforced concrete buildings of an 'improved' type have been designed by Hewitt's of Cranleigh Ltd., Cranleigh, Surrey. The makers state that the 'improved' design costs no more than their earlier buildings which are widely used in many industries. A 'Cranley' warehouse of 85,500 cu. ft. capacity would cost about £4,500, so it is said.

Parliamentary Topics

MR. CALLAGHAN asked the Minister of Education on 22 June what facilities were to be made available to the Students' Union Council in the extensions to the Cardiff College of Technology & Commerce and what extensions he had authorized, or was considering, to the College. Sir David Eccles replied that he had agreed with the Cardiff local education authority that the Civic Centre site should be developed for advanced studies in pharmacy, chemistry and biology, and for communal facilities. The authority was considering what these facilities should be.

REPLYING to a written question recently, Mr. Bevins, Parliamentary Secretary to the Ministry of Works, as representing the Lord President of the Council, announced that the proceedings of the symposium on 'High Energy Physics' held by the European Organization for Nuclear Research in Geneva from 11 to 23 June, would not be published before the end of the year owing to the work involved.

THE Minister of Education, Sir David Eccles, announced in a written answer that the numbers of candidates who satisfied the minimum conditions of entry for State scholarships in each of the last five years were as follows:—456 in 1955, 425 in 1954, 429 in 1953, 351 in 1952 and 454 in 1951.

REPLYING to a question recently, Mr. Aubrey Jones, Minister of Fuel & Power, said that in the year ended March, 1956, total deliveries of black oils—other than refineries' own consumption and Diesel oil for road vehicles—increased by 1.2 million tons, or 18 per cent over the previous year, the coal equivalent of the increase being about two million tons. The Minister added that although he could not view with satisfaction the substitution of oil for coal —as oil involved a net burden on the balance of payments—the energy problem was such that Britain needed every kind of fuel it could obtain.

C

Publications & Announcements

A REVISED stable isotopes inventory and price list is available from Oak Ridge National Laboratory, which Union Carbide and Carbon Corporation operates for the US Atomic Energy Commission. Changes in this catalogue were made in accordance with the new distribution policy set forth by the AEC earlier this year. Under the old distribution policy, electromagnetically enriched isotopes were only lent to users in the US. Although this loan procedure limited their uses, it provided isotopes at very reasonable cost to the user. Also, many of the isotopes were returned to stock after expiration of the loan period and could be made available to new users. Because it would be impractical to lend isotopes to certain foreign users, a limited sales policy has been in effect for the past two years. The revised procedures provide for the outright sale of many enriched stable isotopes to all domestic users, as well as to certain foreign users, and permits the loan of samples of rare and expensive items under certain conditions. Moreover, neither domestic nor foreign applicants will be required to file and obtain AEC approval before purchasing the materials. Complete details of the sales and loan policy are contained in the new stable isotopes catalogue. Additional information may be obtained by writing to: The Stable Isotopes Division, Oak Ridge National Laboratory, Union Carbide Nuclear Company, Oak Ridge, Tennessee.

* * *

TWO illustrated wall charts presenting up-to-date instructions for the safe handling of chlorine and caustic soda have been prepared by Olin Mathieson Chemical Corporation for users and handlers of these chemicals. The charts are printed in large type on weatherproof, plastic-impregnated paper and are suitable for hanging in either outdoor or indoor areas where chlorine or caustic soda are unloaded or used. The chlorine chart describes proper procedures for unloading tank cars and ton containers, what to do in case of a leak, and first aid measures to be followed in the event of exposure to chlorine. The caustic soda chart presents the steps for unloading tank cars of 50 per cent and 73 per cent caustic soda and a list of safety rules to be observed in handling the liquid material. It also includes instructions for preparation of tank cars for the return trip to the manufacturer. Both charts are available from Industrial Chemicals Division, Olin Mathieson Chemical Corporation, Baltimore 3, Maryland.

* * *

A NEW catalogue of 'Monax and Other Laboratory Glassware' has been published by John Moncrieff Ltd., of Perth, Scotland. The publication states that Monax is a borosilicate glass with a high percentage of silica combined with small percentages of soda, potash, zinc oxide and alumina in such a manner as to give the greatest stability. The glass was produced after many years of experience and research in the manufacture of glass capable of resisting breakdown caused by chemical, thermal or mechanical treatment. The catalogue gives full details regarding prices, terms and quantity discounts.

* * *

CONTAINED in the June *Bulletin and Laboratory Notes* published by Baird & Tatlock (London) Ltd. is a description of the BTL potentiometric titration apparatus which has been designed for carrying out a wide variety of potentiometric titrations. The titration unit comprises a strong cast aluminium stand fitted with two burette holders, hot-plate and motor driven stirrer. A rheostat is fitted to the base to control speed of stirring. The apparatus embodies a circuit that provides a polarizing current for use with polarized platinum electrodes for certain redox titrations. A modified version of the apparatus will shortly be available to enable it to be used with a Pye universal *p*H meter and Pye glass electrode. This bulletin also contains the first part of an article describing the Chadwell Heath laboratories of Hopkins & Williams Ltd., associates of Baird & Tatlock.

ICI to Meet Air Pollution Deputation

Serious concern was expressed at a recent meeting of Runcorn Urban Council on the question of atmospheric pollution. They have been in communication with ICI Ltd., who are reported to have agreed to meet a deputation from the council on 16 July to discuss the matter.

Safety Notebook

LIQUIDS which are likely to cause a fire risk were considered by Mr. H. W. C. Powell B.Sc., A.R.I.C., of ICI central safety department and former lecturer in chemistry at the Fire Service College, near Dorking, when he spoke to the annual conference of the British Fire Services Association at Bognor Regis on 6 July.

Following are extracts from Mr. Powell's address:

It is clearly of some value to try and discover points of similarity, either in the ignition characteristics or means which may be successfully employed in firefighting, in order to group liquids into different categories. With such a broad survey of liquids which will burn, it is inevitable that for practical purposes some reference should be made to both solids and gases.

Vapours from Solids

Most of the common solids considered to be fire risks give off vapours when they are heated, and it is these vapours which constitute the major fire risk involving such materials. The same is true of liquids, and the technique of fire fighting adopted lies in recognizing the kind of liquid or solid involved and its method of producing vapours.

Mr. Powell then dealt with the hazards arising from the vapours from solids and liquids.

For liquids, the ease of ignition depends upon two main characteristics: The flash point, that is to say its ability to provide sufficient vapour to burn, and the ignition temperature which may be regarded as the actual temperature required to ignite the material after it has been converted into vapour.

Extinction of a fire involving liquids also involves these features but in general it may be said that if temperatures can be brought below the ignition temperature the fire will go out; or if the vapour supply is in some way restricted or cut off then there will be insufficient generated to sustain burning. The latter effect can be achieved in two main ways. For those liquids whose flash point is above everyday temperatures, the liquid may be cooled by applying water to the outside of the container by using water in the form of spray which reaches the surface of the liquid, by stirring cool liquid to the surface or by covering the surface with some material which will prevent the ready escape of vapour and perhaps at the same time carrying out cooling, as with foam, for example.

For those liquids which will mix with water, or with some other liquid which is non-flammable, dilution will reduce the amount of vapour which they produce and perhaps reach a level which leaves insufficient vapour to sustain combustion. In practice where the characteristics of the liquid make this possible, dilution can only be effected where there is sufficient room in the container to hold the amount of material used for the dilution, or where the liquid is spilled.

Most profitable time for methods of extinction to be considered is when fire precautions are being thought about in the design of the vessels to contain liquids. Provision of fixed installations for fire fighting may, at this stage, be included. Much has been said about automation in this country, but automatic measures for the detection and fighting of fires have been available for a long time, but a considerable amount of progress still lies ahead in this field and particularly where liquids are involved.

Controlling Fires

Numerous examples are available of controlling fires by reducing the ignition temperature with the aid of fine water sprays, and by the use of coarser sprays which are intended to pass through the flame area and hit the surface of the burning liquid to cause emulsions or mechanical agitation.

Evaluation of foams has long been of interest to research. Although innumerable fires involving liquids have been fought using this medium, its rapid rate of breakdown in the presence of some liquids has provided much food for thought concerning the best ways to tackle such fires. An ideal foam is one which will remain stable on the surface of all liquids whatever their physical and chemical characteristics, and which can

be applied at a set rate from standard foam-making apparatus without variations in the amount of foam compound needed to be produced for different liquids.

A good deal of work is now going on in pursuance of this ideal and it may be that its achievement is much nearer than was at one time thought possible. In much the same way as battles are won not by using a single weapon but often by a combination of several, so in fact fire fighting techniques may develop and effective extinction be achieved by following one kind of attack with another.

For example it may be possible to control a liquid fire sufficiently by foam to make it approachable enough to deliver the final extinguishing blow by, for instance, dry chemical. It may well prove to be the case that with some of the lower boiling point liquids such as butane. ethylene oxide, butadiene etc., a combination attack often presents a practical solution to fires involving these materials. Such low boiling liquids when alight not only produce hot flames but rather an impressive amount of fire, particularly as regards the height of the flames, since the liquids are constantly boiling at ordinary temperatures. If this is added to the fact that the surface is in constant agitation due to the boiling of the liquids, it can be seen that the foam is being subjected to conditions for which it was never originally designed.

Survey of Flammable Liquids

If a survey were made of the flammable liquids now available in industry and in commerce, to the general public and in other fields today and compared with the situation, say 10 years ago, it would be found that the total amount and the varieties of hazardous liquids have increased very considerably, and we should find much the same story were we to go back 10 years at a time over the last 40 years or more. Parallel with all this is the development of fire-mindedness among those who manufacture, market and use flammable liquids. Public spiritedness and a certain amount of recognition of moral responsibility has prompted a better dissemination of knowledge of fire risks by general education, propaganda, the use of warning labels on packages, and by technical service facilities offered by manufacturers. In addition there is also constant endeavour to replace liquids which are flammable by inactive liquids, where it is possible for such liquids to do the same job as effectively.

Stabilizing Compounds

A branch of chemistry which is having another effect in the direction of producing fire risks is that concerned with stabilizing compounds. At one time when it was required to dissolve a solid so that the liquid could be produced suitable for spraying etc., the only liquid available would be the one in which the solid would actually physically dissolve. Nowadays by the use of stabilizers it is possible to disperse the solid in the form of extremely fine particles which do not dissolve but are held in suspension by a stabilizer in a liquid which has no fire risk.

As an example of this, many emulsions are at present prepared which have as their main liquid water and these of course present no fire risk. Some materials which are manufactured in concentrated form and distributed for dilution at the place in which they are to be used can be diluted with water where previously a flammable liquid such as kerosene might have been essential.

Parallel with the fire risks of liquids which, are mainly due to the vapours, complementary risks arise due to the toxicity of vapours.

Fire in Nylon

FIRE involving a cargo of nylon yarn packed in cardboard cartons stored in the hold of a ship in Swansea docks recently, is being investigated by fire authorities. The Joint Fire Research Organization have been asked to study the incident. Originally it was thought that spontaneous heating may have been the cause, but this theory is not accepted by chemical experts.

A liner due to sail from Tilbury on 26 June with a cargo of nylon wool was delayed for 24 hours while the cargo was removed. The owners of the vessel later stated that preliminary investigations into the small fire at Swansea indicated possibility of its having been caused by spontaneous combustion in a type of cargo hitherto regarded as perfectly safe. They had therefore decided to hold the liner so that the cargo in question could be removed.

Accident Rates Reduced

LOST-time injuries were suffered by seven men and two women in the Nobel Division of ICI during May. None of the injuries was of a serious nature. The Division frequency rate for the month was 0.422.

During May both the Westquarter and Ardeer factories achieved 1,000,000 man-hours of work without a lost time accident.

Accident figures for the various divisions of ICI are now available for the nine-month period July 1955 to March 1956. The Salt Division shows a 43 per cent reduction on its previous best frequency rate of 0.386, and the Alkali Division has made a 15 per cent reduction on a previous best figure of 0.371.

The Nobel Division's figure for the same period was 32 per cent up on its previous figure of 1.070.

Factory Accident Record

NO reportable accident for the last three and a half years at their Stone, Staffs, factory, is the achievement of Quickfit & Quartz Ltd., manufacturers of laboratory glassware and chemical plant in glass. An official of the company told THE CHEMICAL AGE: 'This reflects an excellent attitude on the part of all employees in observing safety regulations. During 1955 there were only three accidents which necessitated an employee having to be absent more than one day or the remainder of the shift on which the accident occurred.'

Thorium Explosions

NINE people were injured, two of them seriously, as a result of two explosions on 2 July in a laboratory at the Sylvanie Electric Company's plant in New York, where research work is carried out for the US Atomic Energy Commission. It is reported that the explosion resulted from the ignition of thorium metal scrap which was being treated for long-term storage. Tests for possible radioactivity were carried out on everyone in the area but no health dangers were found. Thorium is of interest to the atomic energy programme because of its potential value as a breeder material in nuclear reactors.

Fatal Explosion

An explosion occurred at the factory of Explosives & Chemical Products Ltd., Great Oakley, near Harwich, Essex, on Tuesday afternoon, 3 July, killing a 20 year old woman and severely injuring two other workers. The dead woman was drying and bagging nitro-cotton at the time of the explosion.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

CSK PLASTICS LTD., Bury.—1 June mortgage, to District Bank Ltd., securing all moneys due or to become due to the Bank; charged on Hurley Hall Farm, Kingsbury, with fixtures. *Nil. 9 June 1955.

EVERSHED & VIGNOLES LTD. London W.—26 April, substituted security supplemental to a Trust Deed dated 15 March 1956; charged on land and factory etc. at Power Road, Chiswick, comprised in a lease dated 16 January 1956. *Nil. 10 November 1955.

JOHN E. WILLIAMS & CO. LTD. Manchester, colour, paint and varnish manufacturers.—4 June, £2,250 charge, to R. B. Ashcroft, Stretford and ano.; charged on 27 King Street, Stretford. *Nil. 30 August 1955.

Satisfactions

DURABLE PLASTICS LTD. Guildford.—Satisfaction 5 June, of deb. registered 9 June 1953.

PILKINGTON BROTHERS LTD. Liverpool, glass manufacturers.—Satisfaction 8 June, of deb. stock registered 13 November 1947 to the extent of £1,000.

Receiverships

H. & G. PLACE & CO. LTD. (406,064). Drysalters, manufacturers of chemicals etc., Poplar Grove, Sale, Cheshire. Derek E. O'Connor, 70 Spring Gardens, Manchester, ceased to act as Receiver and/or manager on 1 June 1956.

Increases of Capital

OWEN & GREEN LTD. (270,099), chemical and mechanical engineers etc. 18/22 Cornhill, Liverpool, increased by £8,750, in £1 ordinary shares, beyond the registered capital of £1,250.

MURPHY CHEMICAL CO. LTD. (257,224). Garden House, Wheathampstead, Herts, increased by £447,000 in £1 ordinary shares, beyond the registered capital of £53,000.

New Registrations

Essex Land Fertility Service Co. Ltd.

Private company. (568,221). Registered 28 June. Capital £5,000 in £1 shares. Objects: To carry on the business of agricultural merchants and manufacturers of and dealers in manures, fertilizers etc. Directors:— Stanley B. Wheeler, Kingsford, Layer de la Haye, near Colchester; Leonard E. Neep, 3 Welshwood Park Road, Colchester, director of L. E. Neep & Co. Ltd. Secretary: Minnie L. Brown. Solicitors: Marshall & Sutton, Chelmsford. Registered office: Greenacres, Tiptree, Essex.

Barclay House Pharmaceutical Co. Ltd.

Private company. (568,157). Registered 28 June. Capital £500 in £1 shares. Objects: To carry on the business of consulting, analytical, manufacturing, pharmaceutical and general chemists etc. The directors are:—Alfred Arnson, 99 Forest Court, London W2; David Kupferman, 90 Brondesbury Park, London NW2; Alfred E. Cheshire, John Sorrell and Mary E. Box. Secretary: David Kupferman. Registered office: 120 Baker Street, London W1.

Company News

Courtaulds Ltd.

The 43rd annual general meeting of Courtaulds Ltd. will be held on Wednesday 25 July in London. The Group balance from trading and investment income for the year ended 31 March was £18,168,854, compared with just over £20 million for the previous year. In his statement, the chairman, Sir John Hanbury Williams, refers to the world situation of man-made fibres. Production during 1955 was roughly 14 per cent higher than in 1954; the increase amounted to 670 million pounds, and the aggregate figure

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Company News

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reached 5,600 million pounds. Of the increase, about one-fifth was in synthetics and the remaining four-fifths was divided between viscose and acetate yarn and staple.

Griffiths Hughes Proprietaries

Griffiths Hughes has announced a dividend of 7½ per cent on the £1.5 million ordinary capital for the year ended 31 March 1956. The consolidated profit for the operating company and its subsidiaries was £388,573, compared with £424,563 for the previous year. After taxation of £208,753 against £234,236, the payment of dividends and placing £36,175 to reserve, against £64,064, the carry forward is raised from £90,987 to £132,034.

Jenson & Nicholson Group Ltd.

A profit, after deducting tax, of £359,177 was made in 1955 by the Jenson & Nicholson Group Ltd., manufacturers of Robbialac 'Colorizer' paints. Of this sum, £208,154 was earned in this country and £151,023 by the overseas subsidiary companies. Dividends accounted for £83,629 of this profit. The balance has been absorbed by taxation and reserves retained in the group. In his statement to shareholders the chairman said that the recent rise in the cost of certain raw materials such as linseed oil and titanium, and the further increases in wages which took place in February this year were going to make it difficult to keep profits at the present level. 'Linseed oil became in short supply towards the end of 1955 and this, together with the efforts of certain continental manipulators to buy up all available supplies, and the occasional substantial purchases by Russia, has forced the price of this important raw material to 58 per cent above the average price of 1954/55.'

Péchiney (Paris)

The annual general meeting of Péchiney, manufacturers of chemical and metallurgical products, was held in Paris on 28 May. Net profit for 1955, after tax provisions, amounted to Frs 1,825 million. It was accordingly proposed to distribute a gross dividend of Frs 500 per Frs 5,000 share and Frs 434 per new share. Turnover for 1955, excluding taxes, rose by 24 per cent over the previous year, and the export ratio amounted to 22 per cent as against 18 per cent in 1954.

MARKET REPORTS

LONDON.—There have been no outstanding features on the industrial chemicals market during the past week. Trading conditions generally have been steady with contract deliveries being called for in good quantities. The beginning of the new season has witnessed a quiet demand for compound and concentrated fertilizers. Fresh enquiry for the routine soda products and potash chemicals has been reasonably good with quotations unchanged. The lower trend in metal prices is reflected in quotations for the chemical compounds. From 3 July the basis price for dry white lead has been quoted at £145 15s per ton, dry red lead £140 10s per ton and litharge £142 10s per ton. At the time of this report copper sulphate is being offered at £96 10s per ton less two per cent. The coal-tar products market continues firm with a good demand for most products, particularly creosote oil, phenol crystals and cresylic acid.

MANCHESTER.—Annual holiday stoppages at a number of Lancashire industrial centres continue to leave their mark on the consumption of textile and other chemical products. Manchester traders during the past week have experienced rather less activity, although allowing for this seasonal factor, contract deliveries of most leading lines are reasonably good. Caustic soda, and phosphate and bicarbonate of soda are among the products that are also moving well on export accounts. Most fertilizers, as usual at this time of the year, are quiet, but a demand for the tar products is maintained.

GLASGOW.—The past week opened rather quietly, but towards the end the demand for general chemicals increased to such an extent that quite satisfactory trading has been reported from practically all sections of the trade. There have been a number of price increases indicated to come into effect from 1 July. These are not unexpected owing to the recent increase in price of coal, and wage awards in certain sections of the industry. The market on the whole has been fairly steady, although a further fall in the price of copper salts was reported on Friday. Demand for agricultural chemicals is still good.

CLASSIFIED ADVERTISEMENTS

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have interesting and progressive posts to offer with their Cables and Capacitor Development Laboratories at Helsby, near Chester, to:
GRADUATE PHYSICISTS,
CHEMISTS AND ELECTRICAL ENGINEERS.
Previous experience is not essential. Remuneration will be at competitive rates according to age, qualifications and experience. Write to
THE STAFF OFFICER,
PRESCOT, LANCS.,
quoting reference H/34/56, for further information or interview.

CHEMIST
A vacancy exists with the
UNITED KINGDOM ATOMIC ENERGY AUTHORITY,
INDUSTRIAL GROUP,
in the Programmes Section of the Technical Policy Branch, at its
HEADQUARTERS at RISLEY, WARRINGTON, LANCS.

DUTIES—To work in a team engaged in the preparation of long-term programmes dealing with the overall demands likely to be made on the various establishments of the Industrial Group—such as reactor operations, chemical processing, metal fabrication and gaseous diffusion plants and on all other activities connected with the production organisation. Active participation in this work will provide a very good introduction to the whole field of Atomic Energy.

QUALIFICATIONS & EXPERIENCE—Candidate should have an Honours Degree in Chemistry or equivalent qualifications; some experience in the analysis and presentation of plans and programmes is desirable.

The successful candidate will be given a period of training in the specialised processes of atomic energy.

SALARY SCALE—Will be assessed within the scales £1,199 to £1,504. Annual increments are approximately £40. A Contributory Pension Scheme is in operation.

An Authority house for renting by a married person may be available in due course, or, alternatively, substantial assistance may be given towards legal expenses incurred by a married person wishing to purchase his own house.

Suitably qualified persons are invited to send a postcard, quoting reference 1483, for application forms, to the
RECRUITMENT OFFICER,
U.K.A.E.A. (I.G.) HEADQUARTERS,
RISLEY,
WARRINGTON, LANCS.
Closing date: 13 July, 1956.

VESSEL ENGINEERS required by major Contractor to the Petroleum and Chemical Industries for its Project Engineering Department. Duties include preparation of basic design calculations and specifications, analysis of tenders and recommendations for selection of vendor, correspondence with vendors and customers, review of vendors' drawings, etc. Applicants should have minimum qualification of H.N.C. and some experience of vessel design and construction. Salary range £800 to £1,100 per annum, depending on qualifications and experience. Write to **BOX No. C.A. 3479, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

WENGERS, LTD., ETRURIA, are expanding their Technical Staff and invite applications for the position of a Senior Colour Chemist. Applicants should have extensive experience in the development and manufacture of ceramic colours and should have a sound theoretical background, preferably at degree level. A good salary will be paid, and there is a non-contributory pension scheme in operation. Applications should be in own handwriting, giving fullest particulars and salary required; they will be treated in strictest confidence and should be addressed to the **MANAGING DIRECTOR, WENGERS, LTD., ETRURIA, STOKE-ON-TRENT.**

LABORATORY ASSISTANTS required by heavy chemical manufacturers in East London. Applicants should be of G.C.E. ordinary or advanced level standard, and be prepared to continue part-time studies for further qualifications. Salary in accordance with B.A.C. scales. Apply **PERSONNEL MANAGER, HEMINGWAY & CO., LTD., 22, MARSHGATE LANE, STRATFORD, E.15.**

ENGINEERING Firm in N.E., of international repute, require **MANAGER** for their rapidly expanding Industrial Chemical Plant division. Must have sound knowledge of Chemical Engineering as applied to fluid solid separation. Experience of sales and general management essential. Practical knowledge of filtration plant construction an advantage. Sound position, with excellent prospects for right man. **BOX No. C.A. 3481, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

MONSANTO CHEMICALS, LIMITED,
invite applications from
CHEMISTS, PHYSICISTS,
CHEMICAL and MECHANICAL ENGINEERS,
for positions in their Research Laboratories in North and South Wales, and Technical Service Laboratories near London, to staff an expanding research programme.

Applicants should possess good scientific or technical qualifications, but need not necessarily have had previous industrial experience.

Initial starting salaries will be fully commensurate with qualifications and experience, and sympathetic consideration will be given to the housing problems of married men.

The company operates a non-contributory Pension Scheme, which includes a generous endowment life assurance cover.

Programmes planned cover all phases of research involved in the development, manufacture and use of a wide range of organic chemicals and plastics. Specific vacancies exist for:—

(*a*) Organic Chemists interested in synthetic organic research.
(*b*) Chemical Engineers and Organic Chemists for work on process development.
(*c*) Physical Chemists, Physicists, and Mechanical Engineers for work in fields associated with polymer development.
(*d*) Physicists, Engineers and Chemists for application research work and technical service connected with use of plastics, and a wide range of other functional chemicals, e.g., rubber chemicals, oil additives, etc.

Applications, giving full details of age, education, training and experience, should be sent in writing to the
CHIEF PERSONNEL OFFICER,
MONSANTO CHEMICALS, LIMITED,
MONSANTO HOUSE,
10-18 VICTORIA STREET,
LONDON, S.W.1.

FEDERATION OF NIGERIA
ASSISTANT GOVERNMENT CHEMIST

QUALIFICATIONS

Associateship of R.I.C. or an Honours Degree in Chemistry of a British University.

DUTIES

General analytical, including bacteriological and chemical analysis and forensic work.

TERMS OF APPOINTMENT

On permanent and pensionable terms with emoluments in the scale £1,086-£1,680 per annum, or on contract with emoluments in the scale £1,290-£1,956 per annum, plus gratuity. Outfit allowance. Free passages officer and wife. Allowances and passage concessions for children. Furnished quarters at rental. Free medical attention. Income tax at local rates.

Apply to:
DIRECTOR OF RECRUITMENT,
COLONIAL OFFICE,
LONDON, S.W.1.
State age, qualifications and experience.
Quote BCD 97/14/01.

METALLURGIST/CHEMIST required for control of incoming material supplies by large manufacturing unit in light electro-mechanical industry in the West Riding of Yorkshire. Experience in the analysis of metals, hardness testing and plating essential. Please apply, stating age, experience and present salary, to **BOX No. C.A. 3483, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

CHEMICAL ENGINEERS FOR REFINERY PROCESS ENGINEERING POSITIONS

THE BAHRAIN PETROLEUM CO. LTD. have openings in their Research and Development Department for Graduate Chemical Engineers interested in Refinery technical service work concerned with evaluation of process performance, process and product quality control and technical planning of forward operations.

Applicants should be under 35 years of age and preference is for those with previous similar experience in oil refineries or allied plants, though newly graduated men accepted for training.

Salaries are in accordance with qualifications and experience, with adequate living allowance, air-conditioned accommodation. Medical attention provided with kit allowance, pension scheme and provident fund, paid local and home leaves. Apply in writing, with full particulars, to

CALTEX SERVICES LIMITED,
THAMES HOUSE SOUTH,
MILLBANK,
LONDON, S.W.1.

YOUNG GRADUATE **ORGANIC CHEMIST** required for Research and Development work in connection with vegetable and synthetic tanning materials. Age 24-27; previous experience in this type of work not essential. Applications to the **CHIEF CHEMIST, WALKER EXTRACT AND CHEMICAL COMPANY, LIMITED, BOLTON, LANCS.**

BILLINGHAM ICI DIVISION

ENGINEERING RESEARCH DEPARTMENT

ENGINEERS
PHYSICISTS

The small particles field in the chemical industry offers unusual interest and considerable scope in research and development for physicists and engineers. The work already done at Billingham is widely recognised as notable, and a varied programme is continuing on size analysis, dedusting, grinding, etc. An extended investigation of a large-size electrostatic precipitator is at present being made. Publication of research results is encouraged. This work is an example of the activity of the Engineering Research Department in the Billingham Division.

Applications are invited from physicists and chemical and mechanical engineers interested in research work for appointments as Technical Officers. Candidates should have an Honours Degree and be below 40 years of age.

These appointments are permanent and pensionable, and good starting salaries are offered. There is a profit-sharing scheme in operation and assistance can be given towards house purchase. The Company also makes grants towards removal expenses in the case of married men.

Write, giving brief details of age, qualifications and experience, to the Staff Manager, Imperial Chemical Industries, Limited, Billingham Division, Billingham, Co. Durham, quoting reference W/B.7.

Situations Vacant—*continued*

PLANT MANAGER required to take control of chemical processes. The candidate should have a Degree in Chemistry, Engineering or Chemical Engineering, and wide experience in the Chemical, Petroleum Chemical or Tar industries. The position offers possibilities of advancement and a high salary will be paid to the man who proves a success. Applications should be sent to **THE GENERAL MANAGER, LAPORTE CHEMICALS, LTD., BARONET WORKS, WARRINGTON.**

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MIXERS—1 Baker Hand-tilted Trough, **16 in. by 24 in. by 20 in. Fast and loose pulleys and clutch.** "Z" blades.

1 Ditto Power-tilted Trough, 30 in. by 20 in. by 24 in Pulley drive and clutch. Four "L" blades.

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STEEL PLATE STORAGE TANK for sale—21 ft. 9 in. long by 5 ft. diam. Pipe connections, 2 in., 4 in. and 6 in. Photo, etc., from F. J. EDWARDS, LTD., 359, Euston Road, London, N.W.1. (EUSton) 4681.

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(12) 5,000 gal. **GLASS-LINED CYLINDRICAL ENCLOSED TANKS**—18 ft. by 7 ft. 6 in.

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(2) **STAINLESS STEEL JACKETED CYLINDRICAL MIXERS**—39 in. by 32 in. and 40 in. by 24 in. A.C.

STAINLESS STEEL AND CHROME STIRRERS/EMULSIFIERS—¼, ½, 1 and 2 h.p. A.C.

(Unused) **PORTABLE MIXING ARMS**—25 in. shaft, 400/3/50.

MIXERS, PUMPS, CONDENSERS, HYDROS, STILLS, TANKS AND PANS, DRYERS, OVENS, etc.

HARRY H. GARDAM & CO., LTD.

600

MIXERS

1-TON Horizontal Single Trough **POWDER MIXER** by Gardner—8 ft. by 3 ft. by 41 in. deep, of ¼ in. mild steel Scroll-type agitator.

Double-Trough Type **TILTING MIXER**—trough 32 in. by 32 in. by 24 in. deep. Fitted double "Z"-type agitator. Pulley drive.

Unused Single **TROUGH MIXER** by Lang—22 in. sq. by 28 in. deep. Mild steel galvanised construction with cast ends. Sigma-type contra-rotating agitator driven through spur gearing.

Double-Trough Mixer—34 in. by 27 in. by 26 in. deep. Twin "Z" blades. Single spur gearing. Hand tilting, hinged cover. Motorised 400/3/50.

TROUGH MIXER by Morton—twin "Z" blades. Trough 20 in. cube. Pulley drive. Hand tilting.

Four Unused **DEGESTERS** or Horizontal **PRESSURE MIXERS** by G. Hopkins—50 gal. capacity. 19½ in. diam. by 36 in. with 11 in. radius ends. Construction ⅛ in. copper. Horizontal three-blade perforated agitator. Speed 120 r.p.m. Motorised 400/3/50 through reduction gear.

Horizontal **SIFTER/MIXER** by D. Burr—trough 5 ft. by 2 ft. by 30 in. deep. Broken scroll-type agitator. Motorised.

13 Totally Enclosed **SOLUTION MIXERS**—12 ft. long by 6 ft. 6 in. diam. Capacity 10,000 litres. Construction mild steel plate, with dished ends and heavy glanded spiral-type agitators. Motorised 400/3/50. Mounted on mild steel stands. Vessels have top manway 18 in. diam. and 7 in. by 2 in. diam. bottom outlet. W.P. 70 lb.

Size "C" Gardner **SIFTER/MIXER** with timber hopper 18 in. by 9 in. by 9½ in. deep, and brush sifter over mixing chamber 24 in. by 14 in. by 16 in. deep. Scroll-type agitator.

Trough **MIXER** by Baker Perkins—phosphor-bronze lined trough 16 in. sq. by 14 in. deep, fitted twin P.B. blades.

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ONE 9 in. **"RUNAROUND"** Horizontal Conveyor 42 ft. 6 in. long overall, casings arranged at 2 ft. centres. Capacity 25 tons per hour of cement, 72½ lb. per cu. ft. Drive through roller chain and double reduction spur bevel gears, all totally enclosed by 6 h.p. motor and—

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PHOSPHOR-BRONZE 'Z' MIXER, with Jacketed Tilting Pan, 30″×28″×22″.

STAINLESS STEEL 'Z' MIXER, about 5 gal. Two speeds. Built-in A.C. Motor.

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STAINLESS STEEL 200-gal. Pan with Electric Agitator. Water Jacketed.

25 **GALLON CHANGE PAN** or Pony Mixer.

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REVOLVING DRUM, 6′×2′ 4″ wide.

EDGE RUNNER with 5′ Granite Base.

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STAINLESS STEEL VESSELS

VESSELS of all shapes and sizes, jacketed or unjacketed —with stainless steel mixing gear to requirements; also stainless steel storage tanks and vacuum vessels.

"MORWARD" "U"-shaped TROUGH MIXERS—up to 2 tons, in stainless steel, with agitators, scroll or paddle type, jacketed or unjacketed.

Stainless Steel **TROUGHS, TANKS** and **CYLINDERS** made to requirements.

These items can also be fabricated in mild steel.

JACKETED PANS

100g., 150g., and 200g., new, in mild steel, for 100 lb. p.s.i. w.p.—with or without mixing gear.

3 cwt. **TROUGH MIXERS** by **CHALMERS** and **GARDNER** —stainless steel-lined troughs.

50g., 75g. and 100g. heavy duty **MIXERS** by **FALLOWS** and **BATES.** Agitators driven through bevel gears from fast and loose pulley.

200g. cast-iron **JACKETED MIXING VESSEL** with nickel-chrome impellor type agitator driven through bevel gears from fast and loose pulley.

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21 in. **EQUAL TO NEW,** galvanized baskets, electrically driven through centrifugal clutch or belt driven. Safety inter-locks.

AIR COMPRESSORS

THREE 30 c.f.m. at 100 lb. pressure, water cooled automatic overloads, with or without motors.

ONE AEROGRAPH motorized air-cooled compressor, electrically driven, fitted with overloads and mounted on receiver, 100 lb. working pressure.

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